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ABSTRACT

This module seeks to develop teachers' awareness and understanding of the problems of energy-intensive urban growth and its impact on quality-of-life. It seeks to develop understanding of the city as a system; understanding of quality-of-life as applied to the urban ecosystem; and skills in studying and planning for quality urban settings. It also seeks to facilitate teacher development of classroom instructional materials focused on urban growth. (Author/RE)

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ENERGY-INTENSIVE URBAN GROWTH AND THE QUALITY OF LIFE

SE 028 620

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ENERGY-INTENSIVE URBAN GROWTH AND THE QUALITY OF LIFE

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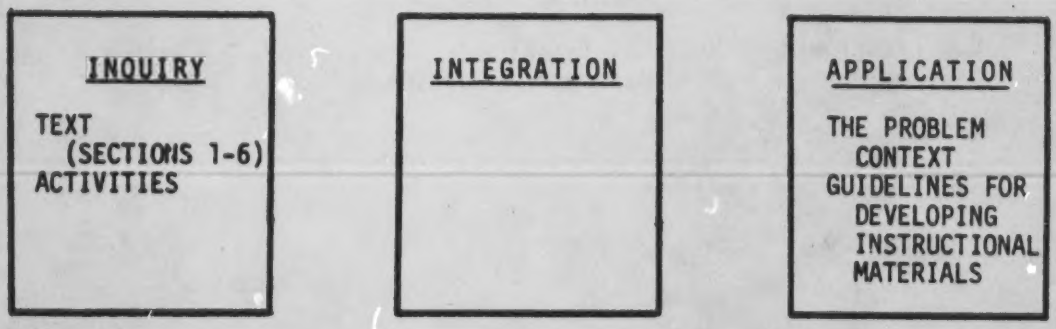
ENERGY-INTENSIVE URBAN GROWTH AND THE QUALITY OF LIFE

THE THREE MAJOR SECTIONS OF THE MODULE:



INQUIRY presents a knowledge base for understanding the urban system and its demands on the environment. It also presents a framework for effective decision-making regarding future patterns of urban growth and the quality of life.

INTEGRATION involves the teacher in the planning, design, and decision-making processes for assessing and improving the urban place.

APPLICATION presents a set of guidelines for planning and implementing instructional programs on the nature of Energy-Intensive Urban Growth and the Quality of Life

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During the past decade, there has been a growing public concern over the rapidly deteriorating state of our environment and the threat this deterioration poses for our ultimate survival. This environmental crisis involves a complex and interrelated set of problems which need to be addressed by both community leaders and individual citizens as they make public and personal decisions with respect to a variety of environmental problems. These problem areas include energy production and conservation, mineral and fossil fuel scarcities, food production, water allocation, urban, agricultural, and recreational land use, population dynamics, and pollution.

In order to adequately prepare citizens to meet the long-range planning and decision-making challenges which these environmental problems present, it is the goal of environmental education to develop their skills in: (1) analyzing environmental problems; (2) examining the pro and con arguments of a variety of public and private interest groups, labor, business, and government organizations; (3) exploring possible side effects of various environmental problem solutions; (4) predicting both short-term and long-term implications of local, state and national environmental programs; (5) articulating personal goals, desires, and lifestyle needs in terms of their aggregate (regional, national, or global) implications for energy use and resource allocation and (6) making long-term lifestyle decisions which are compatible with the requirements for maintaining an appropriate balance between natural system and human system functions.

Developing such capabilities can only occur through well-conceived and meaningful environmental education experiences. Curricula though geared toward people of different ages and societal levels, should have the following in common:

- Environmental education should be holistic and integrated... focusing on and clarifying the complex relationships which exist between natural systems and human systems and examining the components and reciprocal functions of both.

- Environmental education should be transdisciplinary... utilizing information from a variety of fields or disciplines (including the natural sciences, social sciences, and humanities) in order to deal adequately with the natural, social, aesthetic, and ethical dimensions of environmental problems which cut across and extend beyond disciplinary lines.

- Environmental education should be problem-focused and decision-making oriented...involving learners in real environmental problems or issues which are broad enough in scope to have regional, national, or global significance. It should engage learners in values clarification, problem-solving, planning, and decision-making processes which prepare them for dealing with environmental problems affecting both individual lifestyles and societal goals.

These characteristics are consistent with the Environmental Education Act of 1970 (as amended) which defines the requirements for informed, energy-literate, environmentally aware citizens. The Act designated the following as specific areas of concern: population dynamics, pollution, resource allocation and depletion, conservation, transportation, technology, urban and rural planning, environmental quality, and ecological balance.

In real life, these areas or "entities" occur in complex combinations. In fact, it is impossible to find a real life problem that concerns only one of these. For example, it is impossible to imagine a "transportation" problem that is not also concerned with "urban and rural planning" or "environmental quality."

In keeping with this Act, the four modules in this series of environmental education teacher training materials were designed to offer a holistic, transdisciplinary and problem-focused experience for teachers. The four modules are described below:

Optimal Use of Finite Land Resources

> Teachers will use a carrying capacity methodology to examine finite land resources, population dynamics, and available energies that must be in dynamic equilibrium in order to maintain a stable balance between the needs of urban and agricultural systems as they develop and grow, and the needs of the natural system to maintain its ecological integrity.

Energy-Intensive Urban Growth and the Quality of Life

> Teachers will examine the pattern of U.S. urban growth as influenced by economics and other considerations and compare these with considerations for enhancing the quality of life...will examine the potential of current urbanization to reverse its present trend toward high energy costs for urban society decreasing quality of life...will also examine the implications of envisioned future patterns of urbanization on energy costs and the quality of life.

Energy-Conserving Resource Utilization

> Teachers will compare a variety of energy conservation strategies and their contributions toward a stewardship approach to resource utilization and conservation... they will analyze the conservation recommendations of the National Energy Plan and act as a Task Force Committee to propose conservation measures for a local community.

Energy Resource Delivery and Use

> Teachers will examine the role of energy in changing cultural contexts...will study the nature and uses of various conventional and nonconventional energy resources...will examine the dimensions of energy policy making...will evaluate the implications of differing means of energy delivery in terms of technical efficiency, environmental impact, and societal implications...and will apply holistic criteria to the evaluation of an energy policy plan.

This field test version of Energy-Intensive Urban Growth and the Quality of Life is based upon a secondary level environmental education model--with an energy focus--that was developed by the Far West Laboratory in 1977. This model provided us with a guideline and rationale for developing--in this and the other three modules in the series--a holistic understanding of our natural- and human-fashioned environment and for presenting this understanding in the context of environmental issues rather than as a simple presentation of subject matter. Integral to the four modules are the learning processes which allow us to explore the totality of interactions between the systems of humanity and nature and which promote our environmental awareness as citizens.

The contents of this module are restated and organized into goals and objectives which appear in the following chart. The top half of the chart (boxes I, II, and A - D) indicates the broad overall goals of the module and each of its major segments (INQUIRY, INTEGRATION, APPLICATION). The lower half of the chart (boxes 1 - 11, a - o) indicates the specific teacher learning objectives for each section and each major activity of the module. These goals and objectives can serve as performance guides as you proceed through the materials. The chart reappears in its entirety at the beginning of the INQUIRY, INTEGRATION, and APPLICATION segments.

ENERGY-INTENSIVE URBAN GROWTH AND THE QUALITY OF LIFE

BASIC PREPARATION

This Teacher Training Module is designed to be used by a small group of teachers in a self-directed, team learning mode. There is a need, however, for some initial preparations to be made in order to facilitate teachers' completing the module activities and acquiring the necessary knowledge and skills. These preparations include:

- Limit the number of teachers participating in the learning team to between 3-5; this number ensures the necessary level for team learning intensity, individual participation, and group cooperation.
- Select a suitable meeting place, free from distractions and outside interruptions, in which teacher learning activities can occur;
- Locate and assemble all required outside reading materials specified in the activities sections of the module;
- Reproduce these outside reading materials to prevent teachers from having to "wait around" for others to finish them;
- Arrange a suitable and mutually agreed upon schedule in which teachers can complete all readings, exercises, and activities specified in the module.

INQUIRY presents a knowledge base for understanding the urban system and its demands on the environment. It also presents a framework for effective decision-making regarding future patterns of urban growth and the quality of life.

INQUIRY

INQUIRY

The purpose of the INQUIRY is to present you with material and activities that will help you make informed decisions and formulate comprehensive curricula on aspects of Urban Growth and the Quality of Life via a holistic approach. You will be introduced to ways of evaluating the interactions between natural and human systems in the urban setting and their implications for future urban forms. You will also be introduced to a framework for helping you make effective decisions regarding these interactions and implications.

More specifically the INQUIRY will orient you to the notion of the "Urban Ecosystem" by introducing concepts and information about the history and development of urban form, the satisfaction of human needs in an urban setting, natural ecosystem principles as applied to the urban setting, and the relationship of energy and energy supply to the urban place. This section will also introduce the notion of "Quality of Life" as a framework for planning the future of our cities.

After completing the INQUIRY you will:

(A) Understand the city as an ecosystem

(B) Understand the dimensions of Quality of Life as they apply to the urban ecosystem.

This INQUIRY examines urban growth and some indicators for assessing the quality of life in the urban place. Complete all INQUIRY activities (readings, discussions, exercises); work together to alleviate any difficulties encountered in these activities; "keep things moving" on schedule; and draw out each other's personal experiences where appropriate.

Specific things to keep in mind:

1. Estimated time to complete the INQUIRY is 30-35 hours.

2. Select a location or room for teacher learning activities which is reasonably quiet and free from distractions and intrusions (and from the possibility of disturbing or intruding on others). For example, avoid classrooms, teacher lounges/rooms or libraries during regular school hours. These same areas after school would probably be useful.

3. Resources needed will include access to a photocopy machine additional paper, magic markers, crayons or pens (for the Cognitive Map exercise); also, cardboard boxes or styrofoam for 3-dimensional models (optional).

4. Plan a teacher training schedule that will accomodate the completion of all learning activities within the time specified in #1 above. Once teachers agree upon a workable schedule, adhere to it by trying to complete the activities for each section within the allocated time--each section requires about 5-6 hours. If it appears that for a given section of the INQUIRY you are going to run over the allocated time, you can:

   - Reschedule all subsequent section activities to accomodate completing the present section; or
   - Cut off the activity(ies) and move on to the next section.

5. Locate and collect the required reading and material resources specified in the module before the learning sessions begin. This will prevent you and the other teachers from having to spend your "learning" time doing so--unless, of course, the module specifically recommends such information gathering as a useful learning activity.

6. Make certain there are sufficient duplicate copies of the readings so no one is waiting for others to finish.

   Some suggestions for reducing the amount of reading time required are:

   - Make at least one copy of all required readings and have teachers share them; or
   - Make copies of more lengthy readings only and have teachers share these; or
   - Divide up the readings and have individual or pairs of teachers summarize these for the other team members; or
   - Any combination of the above which enables all teachers to complete the required readings in a reasonable amount of time.

7. All or most of the readings can be completed by teachers on their own time in order to free up the meeting times for group discussions and other team learning activities--it makes little sense to waste these occasions on reading sessions. Individual teachers can also take responsibility for leading discussions devoted to specific reading assignments or information gathering activities. Remember to select only the most salient points, concepts, principles or ideas from your readings to present to the group.

8. Some teachers may consistently want to do one type of reading (i.e., science oriented or values oriented). Encourage teachers to do a variety of readings. Try to keep all team members involved as active participants.

9. If members of the learning team are new to one another, you are encouraged to "break the ice" with each other by discussing what personal feelings, thoughts, or ideas you have about the notions of environmental education, ecology, or energy. Perhaps some teachers will have past experiences or anecdotes. This lightens up the beginning of the learning sessions, and gives your group the chance to get their values, beliefs, and attitudes into the open, to "see where everyone is coming from."

10. At the beginning of each section, have a brief overview discussion of what the section contains.

11. You are encouraged to discuss terms and concepts in order to reach a group consensus on their definitions and meanings before proceeding to the next section.

12. Some teachers may find it helpful to glance through the entire INQUIRY before beginning. For others this is not meaningful. But everyone should be familiar with the basic contents of the module (see Table of Contents and Section introductions) and the schedule for completing the sections.

13. Some of the exercises will give teachers ideas about creating materials for their students. This will be helpful in the APPLICATION, but should not be a focus of any discussion in the INQUIRY or INTEGRATION. You are encouraged to make notes for later use.

14. Answers to activity questions can be found in the Appendix, pp. 247 Please do not look through these until each activity is completed.

The Module's Goals and Objectives Chart follows. Only those goals relevant to information presented in the INQUIRY are highlighted.

MODULE GOALS AND OBJECTIVES

(I) To develop teachers' awareness and understanding of the environmental problem area of Energy-Intensive Urban Growth and the Quality of Life.

(II) To facilitate teachers' developing classroom instructional materials focused on the problem or issue of Urban Growth.

(A) Develop an understanding of the city as a system.

(B) Develop an understanding of the "quality of life" as applied to the urban ecosystem.

(C) Develop skills in thinking about and planning for a quality urban setting.

(D) Develop teachers' familiarity with the components of an environmental problem or issue and their experience in planning holistic environmental education for students.

(1) Understand the formation and development of the urban place

(2) Understand the needs & perceptions that shape relationships between people and things in everyday urban life.

(3) Understand some conceptual tools for examining the structure and processes of the urban place.

(4) Understand the energy requirements of the urban ecosystem.

(5) Understand the dimensions of quality of life in the urban setting.

(6) Appreciate the importance of urban planning and design.

(7) Apply criteria for assessing the quality of an urban place.

(8) Use assessment data as a basis for considering & planning improvements to an urban place.

(9) Create an image of an ideal urban place.

(10) Be familiar with the basic characteristics of an environmental problem or issue.

(11) Plan instructional activities on an environmental issue or problem (e.g. Energy-Intensive Urban Growth and the Quality of Life) by applying a set of guideline criteria.

(a) Understand the city as a system.

(b) Understand the history of the growth of the city and the development of urban form.

(c) Understand some individual and societal needs and their means of satisfaction in the urban setting.

(d) Understand the cognitive map as a tool for representing experience in the urban place.

(e) Understand the basic principles of energetics.

(f) Understand a framework for examining the structure of the urban place.

(g) Understand "driving functions" which supply the energy required for urban growth.

(h) Understand types of energy requirements of an urban ecosystem.

(i) Understand resource delivery means for satisfying the urban ecosystem's energy requirements.

(j) Understand a general definition of quality of life.

(k) Become familiar with tools for examining the quality of the urban ecosystem.

(l) Understand some general notions of urban design.

(m) Understand two basic patterns of urban growth which can be addressed in design and planning.

(n) List major topics, concepts, principles, and processes associated with an environmental problem and display them in a contextual map.

(o) Complete a checklist for planning environmental instructional units or lessons.

- INQUIRY -

SECTION 1 | SECTION 2 | SECTION 3 | SECTION 4 | SECTION 5 | SECTION 6

- INTEGRATION -

- APPLICATION -

LOOKING AT THE CITY HOLISTICALLY

...Why are the cities all broke?
Why are the people all angry?
Why are we dying of smoke?
Why are the streets unprotected?
Why are the schools in distress?
Why is the trash uncollected?
How did we make such a mess?[1]

This short poem reflects the way many people feel about American cities today. We are exposed to the process (or results) or urbanization daily. This teacher learning module addresses urbanization, specifically, and the environmental problem area of "energy-intensive" urban growth and the quality of life."

The concerns of urbanization extend far outside city limits; urban trends and policies influence the majority of Americans. The increasing demands of urban populations leave their impact on the quality of life for every sector of society. This module examines both the nature of the national environmental quality and some design strategies that could improve the quality of life in the urban place.

The urban environment, as well as the rural environment, involves the use of natural resources, some of which are in relatively short supply. Examples of these are: clean air and water; land for urban use, including both underground and overground space; fuel

[1] Anonymous, quoted in "Cities Can Work," Saturday Review, April 4, 1970, p. 19.

resources; and amenity resources. In the city, however, as contrasted to the rural environment, natural resources are much more intimately tied with the human-built features of the urban landscape. These connections create what we have called "energy-intensive urban growth."

The Environmental Education Act (1970) specifies the encouragement of curricula for the "understanding of policies and support of activities... .to enhance environmental quality and maintain ecological balance."[2] Therefore, from an environmental education perspective, it is advantageous to examine the environmental quality of urban areas in terms of: (1) their relationship to natural systems, and (2) the overall "quality of life"[3] of their residents. This assessment can then become a background for effecting knowledgeable intervention in public policy-making. In this manner, we hope to give an environmentally-aware citizenry a basis for making urban decisions.

Urbanites are not accustomed to thinking of their environment as a contained, highly interrelated system. They will complain loudly about air pollution, yet vote for a mayor who promises to bring increased industry to town. They will complain about open space (or the lack of it) and yet vote for severe restrictions on the height of buildings. Diverse interests, economics, and politics are obviously all involved in these urban environmental considerations. Because of this diversity we need to seek a common ground, a broad-based conceptual orientation, which will allow citizens of broad interest to work toward sensible, anticipatory public policy.

---

[2] Public Law 91-516, October 30, 1970, Sec. 2.(b).

[3] "Quality of Life" refers to a relative ideal standard of what conditions constitute a high-quality existence, both in rural and urban areas.

For this purpose, this module focuses on the "city as an ecosystem," where it is possible to view urban areas as entities that can be systemically studied using basic concepts that apply to all natural systems. This view is essential, for it is not enough to realize that there is both humanity and nature in cities; it is necessary to examine the city as a natural human phenomenon.

This learning module avoids a formal pedagogical approach--i.e., "we will tell you everything you need to know." Instead, the module stresses:

(1) a self-directed exploration and discussion of a body of information regarding the historical, social, economic and aesthetic aspects of the environmental/energy issues of energy-intensive urban growth and the quality of life.

(2) the practice of planning and decision-making skills which can be used to improve upon or design new urban conditions, and

(3) the planning of urban growth problem-focused learning activities for your students.

SECTION 1

R E S O U R C E S

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SECTION 1

THE CITY...VIEWED AS A SYSTEM

After completing Section 1, you will:

(a) Understand the city as a system

(b) Understand both the history of the growth of the city and the development of the urban form.

In this section, we establish a conceptual base from which to examine the components of the urban place. We provide some definitions and also describe the historical development of the city, with examples of how modern cities reflect their historical development.

Before proceeding with Section 1, as a prelude to the concepts and complexities of the urban ecosystem, discuss your own notions of the city. What <u>is</u> a city? What does the city mean to you?

We have already introduced the notion that the demands of urban environments have an increasing impact on almost every sector of our society. An urban environment involves the intensive use of natural resources for the manufacture of goods and the delivery of services. The technological developments required to deliver these goods and services have placed humans at increasing odds with the adaptive capacities of the natural system that supplies resources.

In addition, humanity has created complex urban settlements which are increasingly at odds with people's behavioral tendencies and perceptual patterns. Often people feel increasingly out of place, yet more dependent on, the city. It is useful, then, to define a conceptual base from which to view these complex interactions between humanity and the urban place.

a. The Ecosystem Model

> "The city, by its nature, is inherently inefficient in its feeding, sheltering, and servicing of its people when compared to rural or village living. It is only when we consider the trade-off of physical energy for psychic energy--the effect on us of other people, places, and ideas--that the true efficiency of the city appears."[1]

The development of cities is one of the most complex subjects of human history. We take the view that the city is in fact a complex system.

SYSTEM

A system may be defined as "a set of elements standing in interrelation among themselves and with the environment."[2] These elements function as a whole by the interaction of the various parts.

Whenever possible, we should visualize the relationship of urban elements in terms of their dynamics in order to see their individual and collective impact. For example, urban systems display a structure of interacting elements...linked together through flows of human-derived energy, materials, and information. Some of these elements...housing developments, transportation networks, and business and government institutions--are highly complex subsystems in themselves.

---

[1] Bender, Tom, Environmental Design Primer, New York: Schocken Books, 1976, p. 105.

[2] Klir, George, ed., Trends in General Systems Theory, New York: Wiley-Interscience, 1972, p. 31.

ECOSYSTEM

Analogies are often made between the city as a system and biological ecosystem. An ecosystem is an example of a self-sustaining natural system which includes both living and nonliving resources, and represents the total complex of factors operating within the system. An ecosystem is commonly used to refer to natural systems. We are expanding this view to include human systems which are part of the natural system and should be viewed that way. An ecosystem can provide a model for organizing the interactions of humanity and nature in the urban place, such as a man-made city park.

SYSTEMS OPERATIONS

Systems as such are characterized by flows of energy and movements of materials and information along cyclic pathways. We can describe these flows and define then as four major operations:

- First, are Input Operations that provide for interaction between the system and its environment, by introducing resources, demands on the system, or anything relevant to the system's operations which will activate the system.
- Second, Transformation, which accounts for anything that the system does with or to the input to transform it into output.
- Third, Output, implies those operations that provide for what comes out of the system, either for the environment or for itself, and how it will exit the system.
- Fourth, and last, is the Feedback and Adjustment process which provides for the ways in which the system adjusts itself to maintain its other operations. This is the system's self-regulating operation.

DIVERSITY

An environment such as the city system is best adapted to human needs when it can provide the widest range of diversity while maintaining internally consistent self-renewing and regulating patterns. The amount of diversity, flexibility, and complexity in a city and its subsystems indicates its resilience. These functions result in a state of dynamic equilibrium, where the system is constantly maintaining a resilient state while at the same time monitoring its various operations. We can describe this resiliency as follows:

DYNAMIC EQUILIBRIUM

> "The capability of a system to respond and permit infinite variety without losing its over-all discipline and logic contributes to its survival. Lack of such capability leads to its disappearance.[3]

An undisturbed system exhibits the environmental ability to adapt to the impact of humanity. However, through urbanization, man has created an entirely new system, a complex form of human and natural system interactions which puts the adaptive capability of natural systems to the test. This system perspective shows that the urban system is characterized by both natural and human control mechanisms. Three interactions are apparent:[4]

- urbanization involves a human modification of the environment
- physical (or "natural") surroundings and resources influence the form, functions and growth of a city
- there is continuous feedback and cyclic flow between man, culture (man's expansion of social interaction), and the physical environment

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[3] Stein, Richard, Architecture and Energy. New York: Anchor Press, 1977, p. 73.

[4] Detwyler, Thomas R., et al., Urbanization and Environment. Belmont, CA: Duxbury Press, 1972, p. 7.

DEFINITIONS OF A CITY

Before beginning to analyze what goes on in an urban place, we must define a city. Both perspective and frame of reference present a problem here. Politically, a city would simply be defined by its city boundaries. However, as we shall see more clearly later on, artificial map lines do not produce a viable subsystem. Boundaries vary according to purpose. Space and time do not create static boundaries, and defined systemically, boundaries will vary according to the scale or dimension of inquiry.

There are many different ways to define a city, including legal boundaries, geographical boundaries, transportation or commuting fields, economic trade areas, county groupings, metropolitan areas, and energy and resource boundaries.[5] We shall not attempt to limit the term here, for our purpose is to examine the city as a phenomenon rather than as an example. Detwyler's definition is more than adequate:

> "A city is a special combination of a place and its people. City is broadly defined here to include the totality of natural, social, and artificial components aggregated in populous places; the population has a highly organized culture including various skills but lacking self-sufficiency in the production of energy (including food)."[6]

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[5] Elgin, Duane, et al. City Size and the Quality of Life, Palo Alto: Stanford Research Institute, November, 1974, p. 2,

[6] Detwyler, Urbanization and Environment, Belmont, CA: Duxbury Press, 1972, p. 5.

URBANIZATION

We use the term "urban," and "urban place" synonymously with "city." An "urban area" or "metropolitan area" is a "group of coalescent cities or the space occupied by them."[7] "Urbanization" implies the establishment and development of cities, and growth in physical size and population--both internally, as reflected by urban renewal and neighborhood renovation, and externally, as evidenced by urban sprawl.

A holistic view of the "urban organism" requires that we enlarge our perspective from one of simply examining the obvious elements and patterns of the city to one of observing the entire form of the urban place.[8] By shifting lenses to various depths, we can then observe the parts of this form, the obvious moving and unmoving parts and connections, as well as the underlying elements and relationships (such as economic and political structure), which are not so highly visible.

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[7] Ibid, p. 6.

[8] Havlick, Spenser, The Urban Organism. New York: Macmillan, 1974.

b. The Origin and Development of Cities: A Historical Perspective

Using a systemic view of the city, we can examine some historical patterns in the growth of the urban form. As small residential clusters assemble into urban organization patterns, needs begin to emerge which reflect the concerns of the larger group. Their satisfaction is reflected in the physical arrangement of the city. For example, a central transportation service becomes necessary for conveying goods and services.

The historical development of cities reveals some characteristics common to all settlements which have contributed to their functional diversity. Human societies have produced four basic patterns of settlements, defined by physical shape.[9] Portions of all four are found in a modern city. The four patterns are:

SETTLEMENT PATTERNS

- Geomorphic
- Concentric
- Orthogonal
- Clustered

[9] Moholy-Nagy, Sybil, "The Four Environments of Man" in ENVIRON/MENTAL, Paul Shepard, ed. Boston: Houghton-Miflin, 1971, p. 166.

Geomorphic Communities

> "A community is...the visible presence of kinsmen and neighbors, sharing common life, security of a place of limited dimensions, easily explored concrete satisfactions, meaningful sights and smells, familiar landmarks."[10]

Earlier communities were formed because basic survival needs were best satisfied by group efforts.

The structure of the community evolved in response to the environment upon which its survival depended. Usually these early communities were held together by the need for mutual defense. There was little specialization, and no escape from the organic cycle of seasonal living. Certain aspects of these early patterns survive as community necessities: to create channels for neighborly help and initiative, to meet face-to-face for personal assessment and discussion, and, ". . .to take part in communal celebrations in a circle of identifiable faces and persons."[11]

This concept of shortened distances, through which an individual is identified as part of a group, is characteristic of the stage of development in which the community becomes recognizable as a unit in itself. Rural towns became necessary to stabilize the flow of goods and services through a central place of supply and trade. This division into residential populations organized individuals into groups small enough for them to be held accountable for their actions in relation to the group. It enabled groups to develop characteristics distinguishing them from other populations and an administrative structure to further their identities. For the individual, it was an environment whose". . .very restrictions increased his own sense of adequacy," because it was". . .cut to man's size and within his grasp."[12]

Modern neighborhoods are analogous to primitive communities in that they meet society's needs for human-scale relationships between residential groups in a large place.

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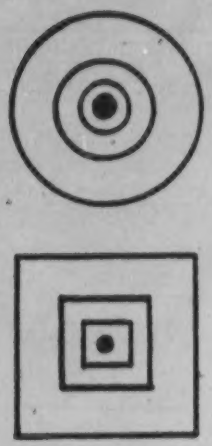
[10] Mumford, Lewis, The Transformations of Man. New York: Harper Bros, 1956, p. 31.

[11] Ibid, p. 195.

[12] Ibid, p. 37.

Concentric Cities



CONCENTRIC CITY PLANS

> "Each temple is an exposition of metaphysical knowledge. . . . While it is the extended universe in a likeness and the form of the way that leads beyond it, it is also the collective shape of its own history."[13]

Concentric cities were established originally for ideological reasons, and featured a symbolic or religious core surrounded by radiating cycles of communication. Houses were generally aligned with the structure which was the spiritual center, as were places of trade, and other structures. The significance of a concentric plan was always cosmological, whether it was oriented to the symbolic representation of religious power like a church or temple, or to a governmental ideal, embodied in the splendor of a palace.

In terms of the evolution of the city, the important thing about this type of focused, planned urban center is that it required commitment of natural resources and energy from a surrounding region to one population center. This aspect of the concentric city marks a shift in cultural and social institutions from a preoccupation with meeting basic physical needs, to a greater size and complexity of organization and an improved ability to disseminate innovations.

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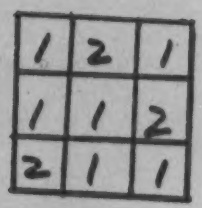
[13] Stella Kramrisch, from The Hindu Temple as quoted in Bender, Environmental Design Primer. New York: Schocken Books, 1976, p. 142.

Orthogonal Cities:



ORTHOGONAL MATRIX

> "Empires are effective disseminators of urban forms because they have to build cities with which to maintain military supremacy in conquered regions."[14]

"Orthogonal" is a term borrowed from mathematics which refers to the division of a matrix into rows or columns that show equal sums in both directions. Orthogonal cities became compartmentalized by function.

The orthogonal city resulted from a change in the urban self-image. Imperalism needed to create city strongholds in which the spoils of conquest could be collected. These cities required an administrative apparatus which could effectively tap the resources of the conquered area and encourage the commerce necessary to supply the military and increase the wealth of the homeland. Also, the empire added to its urban development skills by cultural diffusion from conquered areas and by the import of specialists.

Merchants, instead of being central to the city core as trade represenatives, were confined to their own sector (analagous to a box in the matrix), no less affluent than the royal city, but separate from it. The royal city was where administration defined the success or failure of imperialist efforts. The orthogonal city was multi-faceted and multi-focal, with palace and barracks, temple, assembly and law court, theatre and circus, markets, shops, tenements and slums, all in their own sectors.

The Middle Ages saw the reversion to a concentric pattern of settlement. People were seeking protection from local cathedrals and castles rather than from distant empires. The Catholic Church redefined urban centers and filled the roads with pilgrimages of merchants and crusaders, going to and from centers of religious experience. However, as the European cities evolved, a more settled political situation allowed the orthogonal pattern to be superimposed on the concentric, with separate neighborhoods for each guild or craft.

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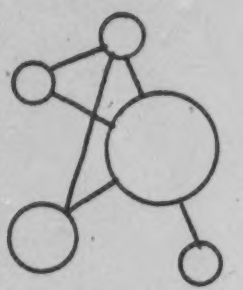
[14] Scientific American, Cities. New York: Alfred Knopf, 1971, p. 34.

The Industrial Revolution increased the tendency of cites to develop diverse functional centers on the Imperial model, with one vital difference. They were still administratively controlled from the center. However, this time the monumental public buildings were erected by and for the "empire builders," the industrial magnates, and the utility providers who began the current complex interrelationship between government and industry.

Clusters:



CLUSTERS

> "There was a time when everything that was important in a region happened at its center; when all roads led to the center (before the automobile made possible the discovery that all roads also led away from the center)."[15]

The cluster is a splinter of the urban unit, outside the context of the city environment, but dependent on it for existence. It forms an exurban and regional environment, extending the services and functions of the central core. It has assumed a great importance in the second half of the 20th century.

Its beginnings are ancient. Other cultures have segregated the extremes of a settlement--either the social outcasts or monastaries--outside the city proper. Currently, the two extremes of the social scale still cluster outside the city--derelicts and squatters in barrios and waterfronts--and the socially elect in the suburbs which they settled when their own factories polluted wealthy urban neighborhoods. These small clusters have become blotches on maps, visibly carrying energy demands outside the physical structure of the city. This dissociation has spread back to the inner city in turn, with its welfare housing and ghettos.

[15] Clay, Grady, Close-Up. New York: Praeger Pub., 1973, p. 34.

ACTIVITY

FACILITATING NOTES

For the activity question #7, p. 28, teachers should definitely list examples from their own experience. It will also be useful for the group to compare reasons for using specific examples.

OBJECTIVES:
(a) Understand an ecosystemic perspective of the city.
(b) Understand the history of the growth of the city and the development of urban form.

READINGS: Stearns, Forrest W., & Tom Montag, ed. The Urban Ecosystem: A Holistic Approach. 1974, Part 1, pp. 15-31.

Havlick, Spenser. The Urban Organism. 1974, pp. 1-12; 30-35.

Russwurm, Lorne, and Edward Sommerville, Man's Natural Environment: A Systems Approach. 1971, Ch. 1, 10-16.

TO DO: Complete the readings, review the section text, and answer the following questions:

1. What are common characteristics of systems?

2. What are the most apparent interactions among the elements of an urban system?

3. Why is the concept of diversity important to city development?

4. What kinds of physical conditions in cities help generate diversity?

5. What is carrying capacity? Why is this concept important to urban resource management?

6. What are some conclusions about the state of cities that become apparent when we take the ecosystem approach?

7. What are four historical patterns of settlement? Give examples of each that are still observable in a modern city? Give examples of each from your own city or urban area.

SECTION 2

RESOURCES

Boulding, Kenneth. The Image: Knowledge in Life and Society. Ann Arbor: University of Michigan Press, 1975.

Clay, Grady. Close-Up: How to Read the American City. New York: Praeger Pub., 1973.

Hall, Edward T. The Hidden Dimension. New York: Doubleday & Co., Inc., 1969.

Halprin, Lawrence. The RSVP Cycles: Creative Processes in the Human Environment. New York: George Braziller, Inc., 1969.

Hinkle, Lawrence E., and Loring, William C., ed. The Effect of the Man-Made Environment on Health and Behavior. U. S. Department of Health, Education, and Welfare, Washington, DC: U.S.G.P.O., 1977.

Ittleson, William, and Proshansky, H. M. Introduction to Environmental Psychology. New York: Holt, Rinehart and Winston, Inc., 1974.

Leinwand, Gerald. The City as a Community. New York: Washington Square Press, 1970.

Lynch, Kevin. The Image of the City. Cambridge, MA: The M.I.T. Press, 1960.

Milgram, Stanley. "The Experience of Living in Cities," in ENVIRON/MENTAL, Paul Shepard, ed. Boston: Houghton-Mifflin Co., 1971.

Sommer, Robert. Personal Space: The Behavioral Basis of Design. New Jersey: Prentice-Hall, Inc., 1969.

Stearns, Forrest, and Montag, Tom, ed. The Urban Ecosystem: A Holistic Approach. Stroudsberg, PA: Dowden, Hutchinson & Ross, Inc., 1974.

Wurman, Richard Saul. Making The City Observable. Walker Art Center, Minneapolis, and the M.I.T. Press, Cambridge, 1971.

SECTION 2

THE URBAN IMAGE

After completing Section 2, you will:

(c) Understand some individual and societal needs and their means of satisfaction in the urban setting.

(d) Understand the cognitive map as a tool for representing experience in the urban place.

We view our cities in a variety of ways, from monstrous consumers of energy to cultural centers, from living environments, to places of employment. In this section, we examine the urban setting in terms of the satisfaction of needs, and present some concepts that reflect the ways in which we interact in and with the urban place.

How do individuals and groups make their way through the size and complexity of a city in order to satisfy their personal needs? What needs and perceptions shape the relationships between people and things in everyday urban life?

The degree of physical access between people and places in the city forms a standard of value. This can be measured and quantified in terms of such things as transportation lines and population distribution. The degree of psychological access, however, depends on the perspective of the user, and is related to the user's needs and attitudes or values about the city.

In the process of finding one's way through the city, a link between physical and psychological access is the environmental image. A clear mental image requires a recognition of the patterns in our surroundings; such an image enables us to move about easily and quickly. These images are provided by legible maps of streets and buildings. In addition to movement, however, we use this image to order our personal communications and social structures. Therefore, it is important that we examine the urban system with an awareness of our own urban environmental image.

ENVIRONMENTAL IMAGE

a. Human Needs in the Urban System

"The city is the most wonderful of machines. Yet, like other machines, could be used for good or evil--turned to the fulfillment of man or to his frustration.[1]

One way to interpret cities is by exploring their function as centers--sources of the supply of energy for the satisfaction of human needs. These needs can be divided into two general classes:

(1) Individual needs: The biological requirements for the survival of the organism. These generally take precedence over societal needs.

(2) Societal needs: Those which are culturally and environmentally determined. These are fluid and dynamic and will change with situations. Societal needs are value-related, and become more important as the individual's basic survival needs are satisfied. They are maintained through social, economic and political organization.

[1] Leinwand, Gerald. The City as a Community. New York: Washington Square Press, 1970, p. 28.

The following is a chart of individual and societal needs upon which energy is spent:[2]

HUMAN NEEDS	SOME MEANS OF SATISFACTION
Residential Shelter	Furniture, Lighting, Appliances, Heating, Cooling, Water Supply, Landscaping
Organizations	Government, Political, Financial, Labor, Service, Special Interest Groups, Professional, Social, Legal
Creativity and Recreation	Sports, Entertainment, Toys, Pets, Arts and Crafts
Food and Beverages	Meats, Vegetables, Dairy, Fruits, Grains, Bakeries, Soft Drinks, Alcohol
Communications	Telephone, Radio, TV, Books, Talk, Magazines, Postal
Health	Exercise Equipment and Clothes Medical Equipment and Supplies
Physical Protection	Police, Fire, Military
Apparel and Grooming	Cosmetics, Clothing, Hair and Body Care
Curiosity and Knowledge	Schools, Libraries, Museums
Spiritual	Churches, Self-realization Centers
Birth and Death	Maternity, Babywear, Funeral Parlors
Mobility	Cars, Buses, Airplanes, Highways

[2]Adapted from a study by the Office of Energy Research and Planning, Office of the Governor, State of Oregon, 1973.

As an example of the interacting relationship between human needs and societal institutions, consider the following:

> "One might speculate that the U.S. industrial machine now dictates its own needs, requiring man to satisfy its ever-increasing appetite for energy, materials and human labor. Actual goods and services produced seem a secondary consideration diverting resources and human efforts from activities which could meet human needs and enrich the quality of life in America."[3]

A further example of this interaction of human needs in relation to economic relationships can be seen in the institution of public utilities. Public utilities provide the energy for a big share of an individual's basic needs by supplying water, natural gas, and electricity (for heat and light). They also provide for socially-derived needs such as transportation and communication networks. Such energy cycles improve access to more information, thus increasing the intensity of the functions of the city. This in turn changes the amount and kind of demand for energy, often resulting in increased utility rates. This is a highly simplified depiction of a very complex subsystem.

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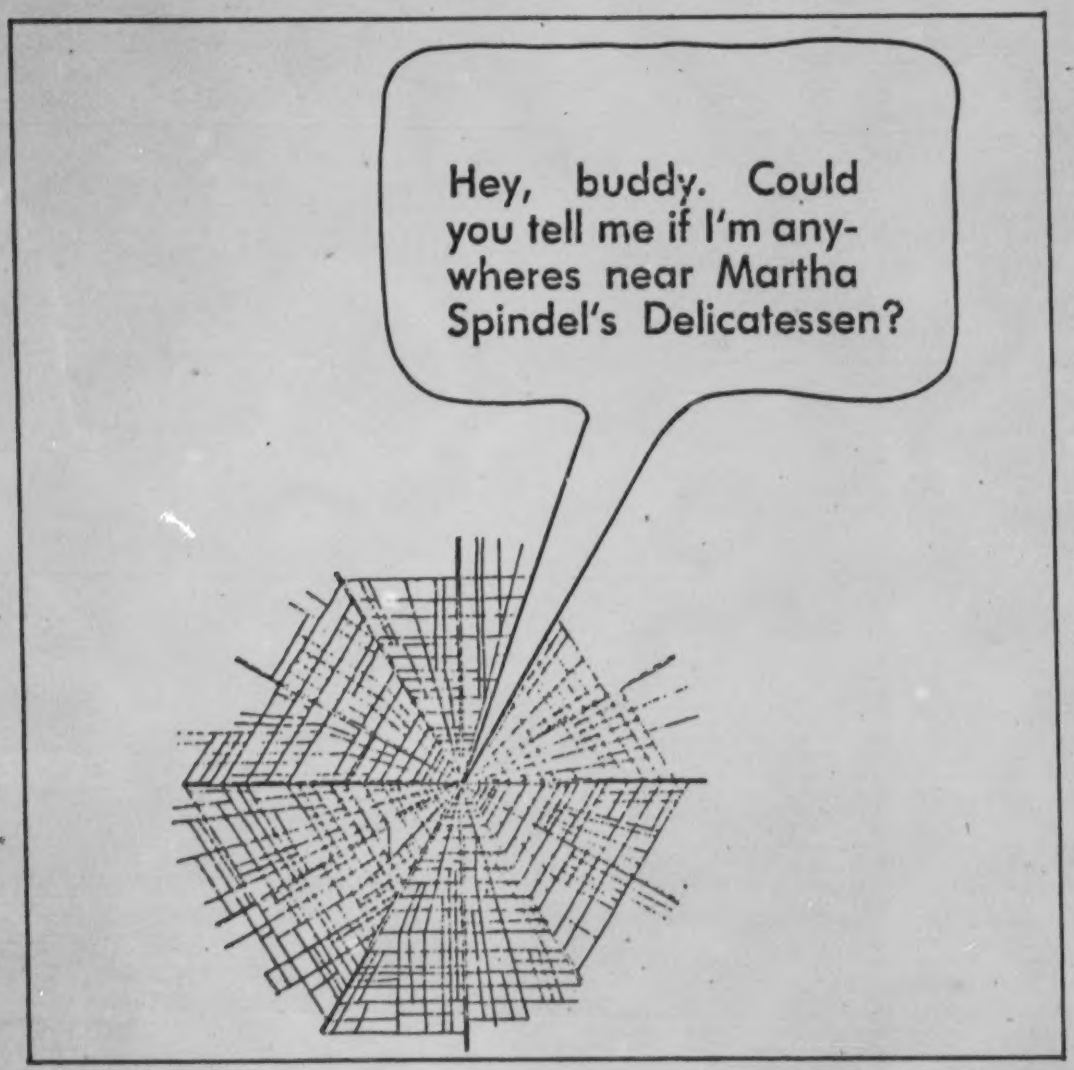
[3] Stearns, Forrest W., and Tom Montag, ed. The Urban Ecosystem: A Holistic Approach. North Scituate, Mass.: Duxbury press, 1971, p. 16.

b. People in the City



Reprinted with permission from Grady Clay[4]

[4]Clay, Grady, Close-up: How to Read the American City. New York: Praeger Pub., 1973, p. 35.

"The very word 'lost' in our language means much more than simple geographical uncertainty; it carries overtones of utter disaster."[5]

How do individuals and groups make their way through the size and complexity of a city in order to satisfy their personal needs?

PUBLIC IMAGE

One characteristic that becomes a moving force in shaping transactions in the city is the "public image" held by large numbers of its inhabitants. This image consists of common mental pictures which define city boundaries, communities, and neighborhoods according to city governments, business interests and the residents who live there.

Individual differences obviously will affect each person's movement, personal relationships, and the way he/she selects among perceived phenomena to adapt to

OVERLOAD

"overload." "Overload" is a term taken from systems analysis language. It refers to a system's inability to process inputs from the environment because there are too many inputs for the system to cope with.[6] It results in the selection of information, either conscious or unconscious.

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[5] Lynch, Kevin, The Image of the City. Cambridge, Mass.: M.I.T. Press, 1960, p. 4.

[6] Migram, Stanley, "The Experience of Living in Cities" in ENVIRON/MENTAL Paul Shepard, ed., p. 185.

TERRITORIALITY

Territoriality is a concept tha is studied extensively because of its role in urban relationships. It provides a standard for determining the sphere of influence or domain of an individual, group, or idea. This concept can include the total relationship between an organism and space. There are common features in the reactions of all organisms in regard to this relationship. These common features include: (1) a restriction of totally unselective movement; (2) a boundary formation between members and non-members; and (3) the form a group assumes or patterns of recognition between members and non-members.

Residential territorial boundaries can be defined in dimensions other than space, distance and movement. Boundaries are also defined in such forms as cost gradients (class structure), physical obstructions and barriers, and enacted enclosures (i.e., utility sectors imposed on the landscape by arbitrary organization from maps) which then deprive residents of a single unit or image where they can be secure in their community identity. Also, areas may be continually renewed or boundaries changed through political action, social interaction and psychological adaptation.

DISTANCING

Distancing is the concept whereby outsiders recognize an area by a wide range of spatial signs; these can be apathetic, invitational or discouraging. "Turfing" by street gangs is one way in which local groups define their communities by boundary displays.

c. Cognitive Map

COGNITIVE MAP

A cognitive map is an individual's internal representation of his/her experience in an environment--a way of visualizing the physical space in which he or she lives. Selective awareness of significant aspects of the environment enables an individual to navigate among complex surroundings. Groups of people who agree on what aspects are significant share less elaborate collective maps which allow them to move freely even among dense crowds.

MOLAR OBJECTS

People conceptualize their environments in terms of "molar objects," or points of interest such as streets, buildings, roads, hills, parks, etc., identifying them either by their relative locations, by their attributes, or most likely, by both. At any specific point in time an individual can experience directly only things which are within his or her perception. However we can "see" things which we are not actually looking at, and can describe the things we are visualizing.

This kind of conceptualizing produces cognitive maps. Such maps are made up of useful representations of the environment based on previous experience, either individual or societal/cultural. People abstract from the space around them a coherent pattern which helps them organize their

activities. Common perception increases the significance of common movements. Groups of people moving into a new environment evolve a composite image of it upon which all can agree. Newcomers to the community, whether through birth or migration, must learn what this image is in order to function there, whether they are aware that this learning is occurring or not. When large numbers of people who share a different social or ethnic background move into an area, not only does the physical environment of the area change, but the community's collective cognitive map of the area changes.

Emerging from these maps are descriptive classifications with specific indicators of physical details and emotional involvements with the space. Will people "see" social problems, objects, people and places, pollution and trash? Distinctive elements of a cognitive map are classified into:

Paths: linear elements--along which people move vehicular or pedestrian.

Edges: linear elements along which people do not move--boundaries, riverfronts, waterfronts, roads which define the edge of town.

Districts: neighborhoods, areas belonging to district groups, areas with a common character, places where groups "hang out."

Landmarks: points of reference--specific buildings, structures, etc.

Nodes: those places where people come together--junctions. These can also be principal places and points of reference--places of major transitions from one activity to another, e.g., places where people go into work, just outside the doors, in parking lots, between the cars and the footpaths.

Obviously there is much to cover in terms of "seeing" what goes on around us and what interactions constitute our everyday existence within a give space. Probing into the relationships between people and their living spaces should help make us aware of the environmental knowledge we already have, and also create a basis from which to examine our environment in more detail.

ACTIVITIES

FACILITATING NOTES

If time is short, it will be advantageous to spend very little time on Activity I so as to allow adequate time for completing Activity II, the Cognitive Map and questionnaire. It is not required to make a three-dimensional, large-scale map, but teachers may find this a more interesting approach. In either case, teachers may tend to spend too much time on the map-making part of this activity. For 3. and 4. (p. 50) group discussion is important as a summary of the section and activities.

OBJECTIVE: (c) Understand some individual and societal needs and their means of satisfaction in the urban setting.

TO DO: Consider what institutions, organizations, businesses, etc. in your local area provide services or in some way contribute to the satisfaction of the individual and societal needs described below?* List at least one example for each need.

Individual Needs	
• Air (who satisfies the need for unpolluted air?) • Water • Space • Energy (food and heat) • Shelter • Waste disposal • Safety	
Societal Needs	
• Political organization • Economic system (labor, capital, materials, power) • Technology • Transportation and Communication • Education and Information • Social, Intellectual, Spiritual • Activities (recreation, "cultural" facilities, sense of community)	

*Adapted from Detwyler and Marcus, Urbanization and Environment, p. 14.

OBJECTIVE: (d) Understand the cognitive map as a tool for representing experience in the urban place

READINGS: Milgram, Stanley, "The Experience of Living in Cities," in ENVIRON/MENTAL, 1971, pp. 183-202.

Lynch, Kevin. The Image of the City, 1960, pp. 1-13.

TO DO:

1. Each teacher makes a map of a chosen area.
2. Teachers answer the questionnaire about their urban area without referring to their maps.
3. As a group compare both the maps and the questionnaire responses.
4. As time permits, complete the "follow-up" suggestion as a group.

1. MAKING A COGNITIVE MAP:

Choose an area to map--a downtown area or a local neighborhood. Indicate which way is north on the map.

Here are some key questions which may suggest things to include in your maps:

Imagine the place you live:

- What things do you picture?
- Where are you going?
- How do you get there?
- Who do you go with?
- What does the place look like? Relative sizes, shapes, placements, seasons, times of day?
- How are the spaces used? Who uses them? Why? Why not?
- You can add anything which affects the way you and your living space interact.

Following are some examples of two-dimensional cognitive maps.

"How'd yuh know deh was such a place," I says, "if yuh neveh been deh befoeh?

"Oh," he says, "I got a map."

"A map?" I says.

"Sure," he says, "I got a map dat tells me about all dese places. I take it wit me every time I come out heah," he says.

And Jesus! Wit dat, he pulls it out of his pocket, an' so help me, but he's got it--he's tellin' duh troot--a big map of duh whole f---place with all duh different pahts mahked out. You know--Carnarsie an' East Noo Yawk an' Faltbush, Bensonhoist, Sout' Brooklyn, duh Heights, Bay Ridge, Greenpernt--duh whole goddam' layout, he'd got it right deh on duh map.

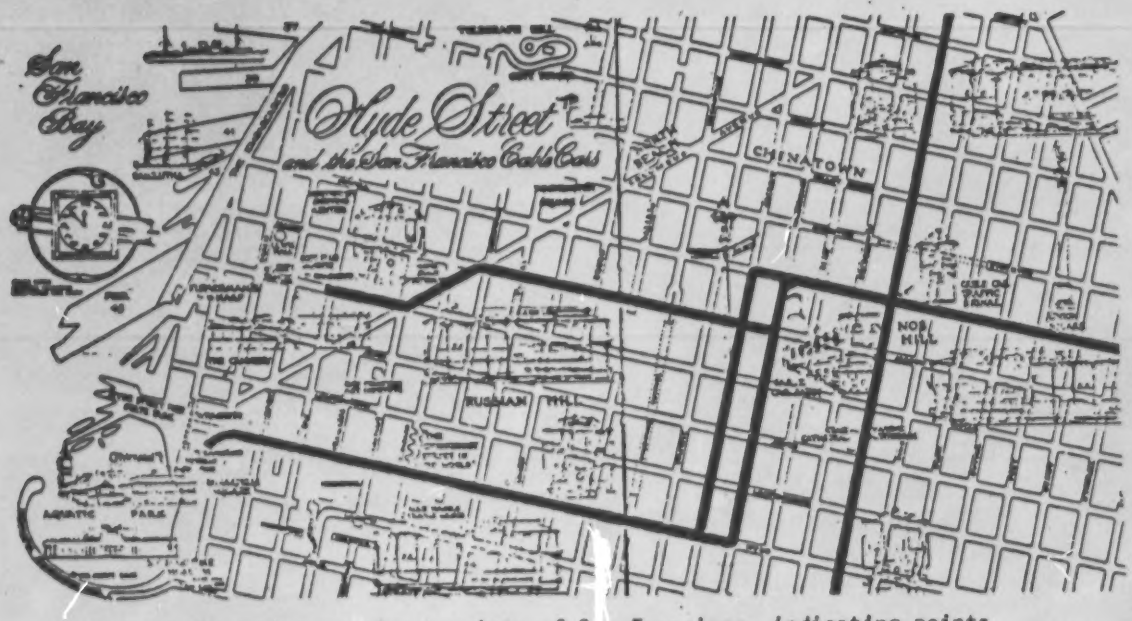
So den duh guy begins to ast me all kinds of nutty questions: how big was Brooklyn an' could I find my way aroun' in it, an' how long would it take a guy to know duh place.

"Listen!" I says, "You get dat idea outa yoeh head right now," I says. "You ain't neveh gonna get to know Brooklyn," I says, "an' I don't even know all deh is to know about it, so how do you expect to know duh town," I says, "when you don't even live heah?"

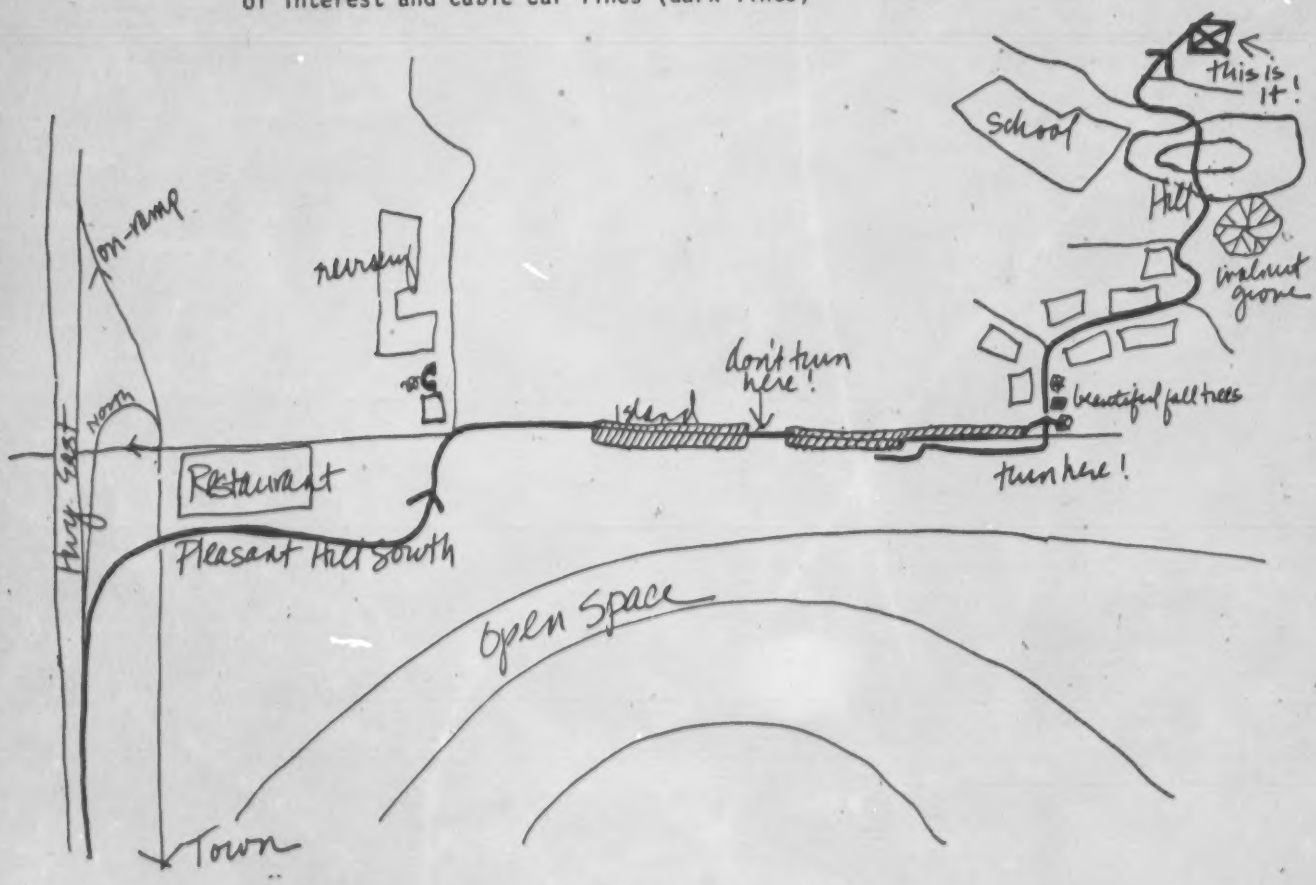
"Yes," he says, "but I got a map to help me find my way about."

"Map or no map," I says, "yuh ain't gonna get to know Brooklyn wit no map," I says.

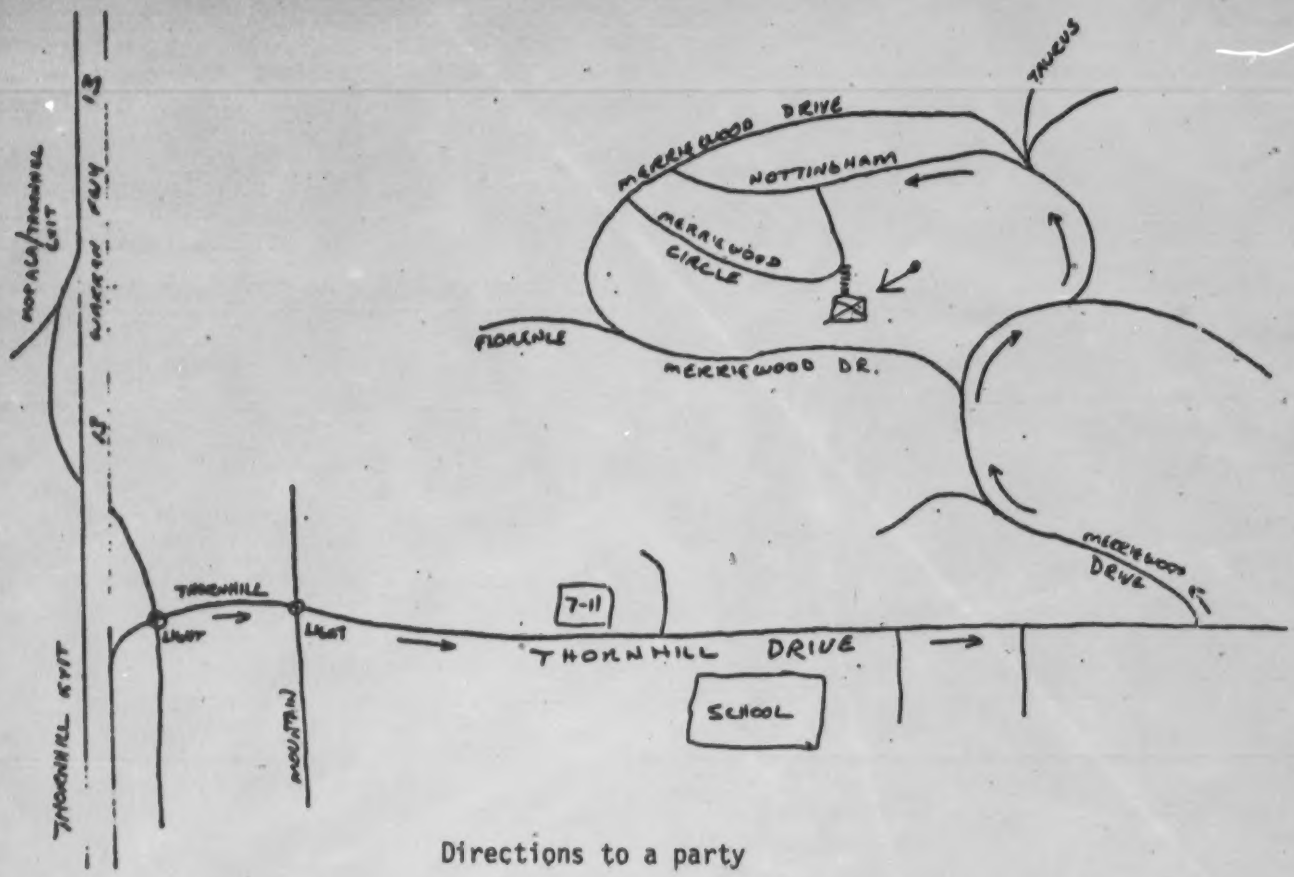
Thomas Wolfe
From Death to Morning
New York: Charles Scribners' Sons, 1963.



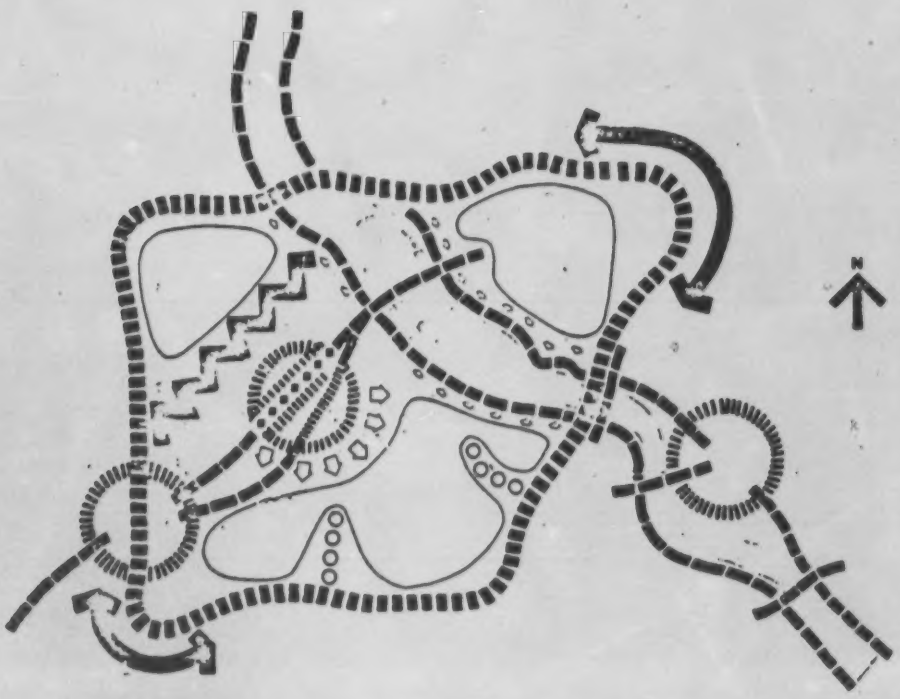
An information map for tourists of San Francisco, indicating points of interest and cable car lines (dark lines)



Directions to a friend's house



Directions to a party



A map of a playground, where different types of lines indicate different uses of the area

2. QUESTIONNAIRE:

Answer the following questions about your urban area:* Do not refer to the maps you have drawn.

1. What do you think of first: what symbolizes your chosen area? How would you broadly describe it in a physical sense?

2. Give complete and precise directions for a trip you normally take--for example, going from home to work or to the store, bank, etc. Picture yourself actually making the trip: describe the sequence of things you would see, hear or smell along the way, including those markers that have become important to you and clues you would give a stranger making the same trip. The names of streets are not as important as their physical placements. Consider--is it easy to get to places within the area? Which? Why? Why not?

3. Do you like or dislike the various parts of your trip? Why? How long would it take you? Are there any parts of the trip which are somewhat unfamiliar to you?

4. What elements of your area(s) are most distinctive? Large or small, which are the easiest for you to identify and remember?

5. Compare these responses with your map. Do the elements on the map seem to reflect these responses? What seems different?

6. With what other cities or parts of cities do you feel familiar? Why? Do these places have any characteristics in common?

*Adapted from Lynch, The Image of the City (1960), McFee, "Children and Cities" (1971), and Aaron, "Changing Spaces" (1975).

3. DISCUSSION:

As a group compare the maps and answers to the questions. Consider the following:

- What areas did individuals in your group choose to map? Why?
- Did your group choose to map a predominant type of area? Discuss possible reasons for this.
- Did your group choose highly different types of areas to map? Why were your individual choices diverse?
- In how many ways did your group map the same kinds of areas? Did you show similar or different types of points of interest?
- Did many of your group indicate the relationship between their areas and outside areas? Is this important? Why? Why not?

4. FOLLOW-UP

Refer back to the text, Section C., Cognitive Map, p. 39, and discuss the following aspects of cognitive maps in relation to an urban environmental image.

Discuss the relationship between what the cognitive maps tell us about a given place and what they can tell you about the entire spatial realm of which it is a part--our communities, towns, cities, states, countries, and planet. Becoming aware of this helps us to build common patterns. The networks existing between people and places--temporal, spatial, psycho-social, and energetic--are integral to this exercise.

If you wish to explore this area further, try making cognitive maps of other spaces. Role-playing is useful in determining how others might view the same space, although it may be necessary to know the people and their backgrounds before we can imagine what their maps would be like.

We should also consider whether we can improve our awareness of the diversity of cognitive maps we use every day. Is it necessary that others know our mapping styles? How important is this kind of communication to our spatial awareness and the ways we share space with others?

SECTION 3

RESOURCES

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SECTION 3

URBAN STRUCTURE AND PROCESS

After completing Section 3, you will:

(e) Understand the basic principles of energetics.

(f) Understand a framework for examining the structure of the urban place.

(g) Understand "driving functions which supply the energy required for urban growth.

The growth of urban areas can be examined in terms of the city's main elements or components, and in terms of the patterns which develop because of the growth of these components. In this section, we introduce a categorization of elements in the urban system and discuss some of the energy inputs to this system which account for its growth.

OPEN SYSTEM

The city is an open system--it is not self-contained and cannot function independently from other parts of the world. The city system receives inputs of energy and material (including food), and produces outputs of energy and material (including waste products).

It would be difficult to define a city system without reference to its parts. These internal parts or subsystems have their own structures and functions. Each responds, changes or interacts in accordance with external causal forces such as energy sources. For example, the city exhibits material, social, political/economic, and transportation subsystems which are useful to study.

a. Energetics

Supplies of energy, materials or information are inputs to the city system and are used by the subsystems to maintain an existing structure or to build a new structure. The system returns transformations of this energy back to the environment. This input/output pattern of the system reflects the dynamic energy flow through the system and between parts of the system.

To understand the energy flows of the city, we use the concept of energetics. This is an approach to natural and human-derived systems that allows the urban ecosystem to be viewed in terms of energy cycles and exchanges. Energetics is a tool for the understanding of the urban organism and its metabolism. The city is composed of external forces which drive the system, storages of energy within the system, and components of energy exchange that alter and are altered by these energy flows at measurable rates.

These components are either altered by becoming larger entities--they are efficient and use energy for growth--or they are inefficient and suffer energy loss and degradation, and are eventually replaced by those more "energy efficient" users. Geographic location, size, density, age, and inner diversity are some of the dimensions of urban form that influence a city's use of energy.

PRINCIPLES OF ENERGETICS

These energy transfers obey certain laws or principles, no matter what process or energy source is involved. These principles of energetics have to be taken into account when describing the behavior of any system using energy. Following is a brief description of the major principles of energetics.

(1) Law of conservation of energy: Energy is neither created nor destroyed.

> "The energy entering a system must be accounted for either as being stored there or as flowing out."[4]

For example: Fuel and raw materials are inputs to a factory and must be accounted for in terms of: energy required to run the factory, energy that is dispersed as heat into the surrounding environment, or energy stored in the end products (output) of the factory.

(2) Law of energy degradation: In any process, there is a continuous degradation of energy from higher to lower forms.

> "In all processes some of the energy loses its ability to do work and is degraded in quality."[5]

Energy that has the ability to do work is called potential energy and is still useful. Energy that has done work is degraded and is no longer useful at its original potential.

For example: A factory takes in energy in the form of raw coal and converts it into: (1) heat, (2) coal products, and (3) waste. The heat and some of the waste can be captured and recycled to do more work, but neither can produce as much work as the original energy stored in the raw coal.

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[4] Odum, Howard T. and Odum, Elisabeth C., Energy Basis for Man and Nature, New York: McGraw-Hill Book Co., 1976, p. 37.

[5] Ibid, p. 38.

(3) The maximum power principle explains why certain systems survive over others.

> "That system survives which gets most energy and uses energy most effectively in competition with other systems."[6]

To "get more energy" or develop more power inflow, a system might:

- Develop storages of high-quality energy
- Use storages to increase energy flow (feedback)
- Use storages as a control mechanism to keep the system stable: inflows balance with outflows
- Recycle materials as needed

The application of this principle to new systems developing in an environment of abundant resources generates competition between rival systems or sub-systems to capture the most energy. The application of this principle to mature systems that are in a steady state with the resources of their environment generates cooperation and sharing of limited available energies.

> "Urbanization has followed the maximum power principle--those systems survive and compete best which maximize their power flow. High energy components of cities have emerged and have required enormous resources for their support so that the city system can continue to function."[7]

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[6] Ibid, p. 39.

[7] Zucchetto, James, Energy Basis for Miami, Florida, and Other Urban Systems: Ph.D. Dissertation, Univ. of Florida, Gainesville, 1975, p.2.

(4) Principle of diminishing returns: Borrowed from economics, this principle explains the multiple limiting factors of an energy system.

When there are several flows of necessary energy as inputs into a system, they have a multiplicative action on the main energy flow of the system. But at the same time each serves as a limiting factor.

For example, in the city, increasing the height of office buildings to provide for increasing financial input to the urban system, necessarily limits the increase of efficient energy use. The people in those offices would probably have to breathe air from fans all day instead of air from natural breezes. The result is a conflict between the optimization of the sub-systems and the goal of optimization of the major system.

> "By viewing the movements of energy and materials into and out of American cities... we see more clearly that the relationship between those movements and the quality of urban life is not simply an economic one.... Higher levels of resource use and economic activity do not automatically raise the quality of life but instead may cause it to decline."[8]

[8] Stearns, The Urban Ecosystem, p. 16.

(5) Energy Quality and Net Energy

ENERGY QUALITY

Energy quality is a measure of an energy form's potential to do work. Higher quality energies such as electricity have had a lot of upgrading in order to increase this potential. The quality of an energy form refers to the diversity of purposes it can be used for. Energy forms of higher quality exhibit greater flexibility; they can be used for a greater variety of purposes. Electricity is a much more versatile form of energy than sunlight or wood.

ENERGY EFFICIENCY

The ratio of the energy input and output is called energy efficiency. We can compare energies of different quality by converting all agencies to the same units, such as solar equivalents or coal equivalents for measuring purposes.

NET ENERGY

We can account for the amount of energy available for work by using the concept of net energy.

After all the costs to the system are accounted for in energy equivalents, we arrive at an indication of the energy "profit" of a process.

To be feasible, a potential resource must return energy in excess of the energy costs. Otherwise the potential energy source drains the existing supply rather than enlarging it.

> "Electricity is a form of energy which is readily adaptible to a wide variety of uses. However, each time energy is changed from one form to another, it is done at less than 100 percent efficiency, that is, a certain portion of the initial energy is used in the changing process itself, releasing heat into the atmosphere at the point of work. At any point in any energy chain it is possible to determine the amount of useful energy present, to convert that to the same unit as the initial energy source, and to evaluate the efficiency of the process to that point."[9]

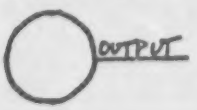
[9] Stein, Architecture and Energy, p. 7.

Energy Flow Diagrams

A set of simple diagrammatic symbols can be used to visualize the behavior of whole energy systems. A diagram made up of such symbols clearly maps the interactions of resources and energy flows of a real system.

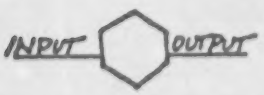
A set of symbols has been developed by H. T. Odum for diagramming the interactions of man and nature.[9] These symbols are based on the most common entities and activities found in all systems that process resources and utilize energy.

The symbols are representative of the following energy processes:



- sources of direct or stored energy

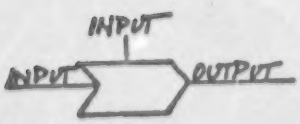
- production subsystem involving photosynthesis activities



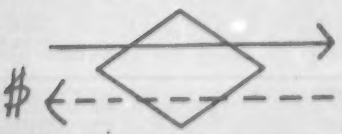
- a self-maintaining consumer system using energy produced elsewhere

- energy storages

- energy sinks (heat losses, wastes)



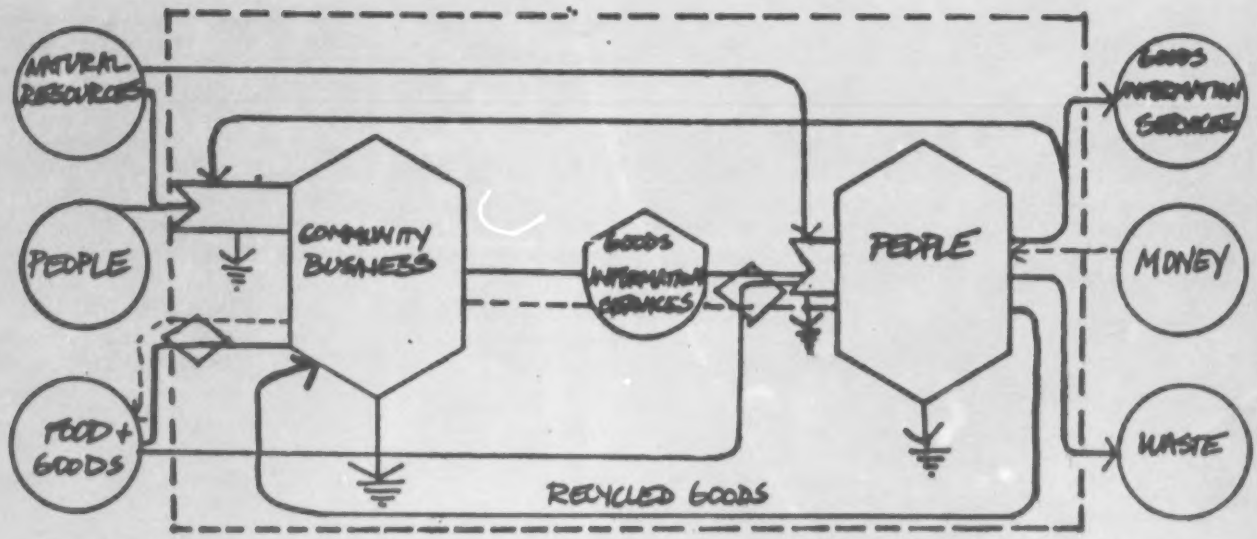
- interaction of energies flowing along pathways



- transaction between pathways--represents money exchange (in one direction) to pay for energy (flowing in the other direction)

[10] Odum & Odum, Energy Basis for Man and Nature, 1976.

Using these symbols, some processes of a community business system can be shown, as inputs flow from left to right:



A COMMUNITY FOOD BUSINESS SYSTEM

In this simple diagram, input to the community food business system is in the form of natural resources, food, and income dollars from outside the system. Natural resources interact with people on their way into the business. Foodstuffs transact with money on their way into the business. Money always flows in the opposite direction from the flow of energy and goods. Goods and services from the business are put into storage and are then transformed into consumables when bought by people. The end-products that often go out of the system are further goods and services, and waste materials, in the form of human wastes and disposable packages. An indication of recycling could be included here if that were the case.

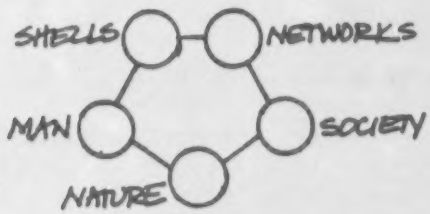
Ekistics

The term "Ekistics" derives from the Greek word meaning "settling down."[1] Ekistics is the "science of human settlements" developed by the Greek planner Constantinos Doxiadis. It is influenced by the disciplines of economic, social, political and administrative sciences, as well as those related to the arts. In this way, the science of ekistics reflects the urban system as it is influenced by economic, political and social institutions.

Doxiadis has divided the concept of human settlements into five interconnected elements: Nature, Man, Society, Shells, and Networks. These broad categories form one basis for understanding the components of urban systems.

EKISTICS ELEMENTS

The Ekistics elements are graphically represented in the following diagram:



(1) Nature: This category represents natural resource ecosystems and their structure and behavior. Included here are such things as land resources, air resources, water resources, and plant and animal life. We can discuss these in terms of systemics and energetics.

[1] Doxiadis, Constantinos, Ekistics, Vol. 41, No. 247, June, 1976.

(2) Man: This category represents humanity, as a system, with an emphasis on those aspects which make up the individual and group image about a setting. This image can be viewed in direct interaction with natural systems on physiological and psychological levels.

(3) Society: This category represents the territorial organization of human settlements based on the daily movements of people. This movement can be viewed in terms of the interactions of human institutions (economic, political, and social) with natural systems, with an emphasis on the creation of laws and regulations.

(4) Shells: This category represents those structures built by humanity to satisfy the various needs of individuals and society.*

(5) Networks: This final category represents those dynamic elements which connect any or all of the above categories, through the movement of energy, materials, and information.[2]

The last category, Networks, is comprised of those connecting elements that account for the patterns of urban growth. These networks can be mapped in terms of their spatial influence. Spatial networks in the city include the following:[3]

NETWORKS

- Economic networks: The combination of transport and market networks encourages the growth of nested and independent markets, expanding the patterns of exchange for commodities, and increasing access to goods and services.

- Population movement networks: Short-term and permanent movement of populations internal and external to the city is an important characteristic of urban areas. "Temporary migration" and the journey to and from work depend on transportation and communication networks between urban and exurban areas, and on the location of industrial activities in intermediate small towns and suburbs.

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[2]See also Havlick, Urban Organism, p. 35-37.

[3]Rondinelli, Dennis A. and Ruddle, Kenneth, "Integrating Spatial Development," Ekistics, No. 257, April, 1977, 185-194.

*Please refer back to Section 2 for a discussion of human needs.

- Technological networks: Technology--equipment, procedures, and methods of production--is also situated spatially and functionally, and has a direct impact on the movement of populations and the resultant economic and energy flows.

- Social networks: Social structure forges ties on many scales, from the neighborhood and local community to the larger city system, and creates a system of values which affects the ways in which people interact in terms of the flow of information, energy, and ideas.

- Service delivery networks: Nearly all services require the support of a minimum of people concentrated in a limited geographic area, a different area for each type of service. This "threshold population" must be of sufficient size and density to attract enough customers to earn profits for suppliers of commercial and professional services, and to allow public services to reach the largest number of people at all times.

- Political, administrative and organizational networks: Urban systems are integrated and changed through a set of political and administrative interactions as reflected in formal government relationships, public budget resources, administrative authority and power bases, informal political and decision links and a high degree of interdependence among specialized organizations--although some offices may not think so!

- Energy networks: Energy in its broadest sense here encompasses all of the other types of movement of energy resources for the growth of the city and the flow of networks through urban elements. It necessarily includes all forms of energy and information.

Networks, like boundaries in a city, are often conceptual, rather than physical, and reflect the specific concerns of those delineating them. Different people or groups--or those same groups at different times--may choose to use different networks to describe connections in the urban system. For example, a

city official may see economic networks as the most important, while a community leader will find services to be primary to his or her view of the city. All of the networks described here may or may not overlap to some degree. The major reason for separating them into different categories is that the connections can be evaluated in terms dependent on the purpose.

This can become a problem in dealing with public agencies, whose networks and boundaries of jurisdiction reflect administrative concerns and therefore do not necessarily coincide with each other. For example, a community association in one California city received a donation of trees for its beautification program, but had to run a bureaucratic gauntlet to get the trees into the ground. They needed to deal with the streets and highway department over siting, the parks department about ongoing maintenance, utility companies and the water department about root interference with underground pipelines and cables, and a host of other restrictions which tended to stifle all but the most enthusiastic.[4] This is one small example of the larger problem of lack of congruence and resolution between administrative networks and the real-world systems they administer.

[4]Oakland Tree Planting Project (Oakland, California).

b. Driving Functions

The growth patterns of cities are partially dependent upon energies supplied by major inputs from processes outside the system. These driving functions represent forces that potentially may act as catalysts for change as they go through the city system and provide energy for urban growth. Stress occurs when these driving functions impose excessive pressures on the system. These include the social stresses created by the processes of politics and economics--forms of human energy--as well as pressures from excessive resource input, transportation networks and power networks. Money, however, is not a driving function. It represents, through transactions, access to resources rather than an actual resource itself, and in this capacity is also a direct force of change.

The chart of driving functions shows the way cities grow and what energy is needed to create a threshold level for change to the next stage. In any system or organism this is the point where increased needs and energy-intake tax the system's capacity or tolerance level to such a degree that it must change in order to survive.

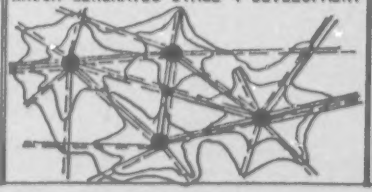
Initially, urbanization begins as dispersed rural subsystems collect energies and materials for the purposes of marketing goods and services in a centralized place.

This collection of people and services requires the development of transportation and storage systems and other support facilities. This necessary shift also represents the first threshold level on the chart between Stage 1 and Stage 2. The presence and location of the transportation system induces a pattern of growth around it, producing denser pockets of energies and large spheres of influence and access. A specialized combination of transportation and power networks then forms to supply the demand for dispersing this concentrated energy and material to consumers, thus reaching the threshold level between Stages 2 and 3. Then, as communications networks grow into a highly developed technological subsystem, that growth becomes a prime driving function in a highly developed urban area, reflecting the national and international trend toward "instant information." These information systems generate their own self-control and self-perpetuation, thereby affecting the control of other components through economics, politics, and concentrated power and influence.

The accompanying chart indicates historical references to help you understand the concept of "driving functions." However, it is important to understand that examples of each stage can be found in any modern urban area.

FIGURE 2

DRIVING FUNCTIONS
AND
STAGES OF URBAN DEVELOPMENT

STAGE OF DEVELOPMENT	WHAT IT IS . . .			WHAT IT LOOKS LIKE . . .	EXAMPLES FROM THE "REAL" WORLD . . .
	DRIVING FUNCTIONS	ENERGY DENSITY	SPHERE OF INFLUENCE AND PSYCHOLOGICAL ACCESS	movement of people and materials movement of information	
STAGE 1	Natural resources and people	Low, evenly distributed geographically	Small		• In early 1800's, only 2.2% of Europe's population lived in cities • Pony Express runs first overland mail service between St. Joseph, MO, and Sacramento, CA--10 1/2 days and 75 ponies--1860
• THIS THRESHOLD OF INFORMATION PRODUCES TECHNOLOGY FOR STORAGE, WHICH GENERATES STAGE 2 DEVELOPMENT					
STAGE 2	Transportation networks	Low, pockets or clusters begin to form at breaks in the transportation system	Larger, but regional		• Lowell, Mass., and other textile towns of mid-1800's shipped finished goods by water and rail • Samuel B. Morse introduces the telegraph to U.S.--1837 • First public power station in U.S. established in New York--Sept.4,1882
• THIS THRESHOLD OF INFORMATION PRODUCES TECHNOLOGY FOR SPECIALIZED SUPPORT SYSTEMS, WHICH GENERATES STAGE 3 DEVELOPMENT					
STAGE 3	Power networks (electric, water, adminstrative)	High concentration of energy at power nodes	Greater, access available to a larger system than one can personally experience		• Union Pacific meets Central Pacific--May 10, 1869 • First transoceanic telephone system-Newfoundland to Maine-1956 • Boulder Dam sends power to Los Angeles, 270 miles--1934 • Brasilia, first capital of the "air age"--1960
• THIS THRESHOLD OF INFORMATION PRODUCES TECHNOLOGY FOR SELF-REGULATING MECHANISMS, WHICH GENERATES STAGE 4 DEVELOPMENT					
STAGE 4	Cybernetic networks	High flux between power nodes	Even greater, access available to a system larger than and/or moving faster than anyone can comprehend		• First satellite communication relay system, Telstar--1962 • Atomic Energy Comm. supports private nuclear power generation --1956; first commercial plant--not even 5 years later • World air travel by supersonic jet plane--1977

c. The Urban Energy Flow Model

The following is an energy flow diagram of an urban ecosystem which provides a synthesis for the conceptual tools presented in this section. (Fig. 3)

Even though this is a simplified model, it clearly demonstrates the complexity of urban energy patterns.

The energy resources that are represented flow from left to right. The "driving functions" or sources of input are the circles on the left, and are considered to be forces creating a state of constant change. The circles to the right are those forms of energy exported from the city system; they become inputs to another system. Energy losses are represented by energy/heat sinks, and are removed by wind and radiation into the earth, water, and atmosphere. For example, losses from transportation systems are often great, because there is a low net energy relationship between fuel costs and transportation efficiency.

Of major importance, although difficult to quantify, is information flow and storage. It is the main control factor for all components of the urban system. The pattern of information movement through the system (who knows what, and how) is more important than the quality, because new information through old patterns "inevitably yields old answers."[1]

[1] Forrester, Jay, Urban Dynamics. Cambridge, Mass.: M.I.T. Press, 1969, Introduction.

Increased population flow into the city will increase stress on urban energy systems. Some control mechanisms will increase urban quality--parks, open space, theatre--while others will degrade quality--traffic, pollution, noise. The more attractive a city appears, the greater the influx of people. The toleration level of a city's inhabitants will also increase, often allowing a high degree of degradation of quality before leveling off to provide a more steady state.

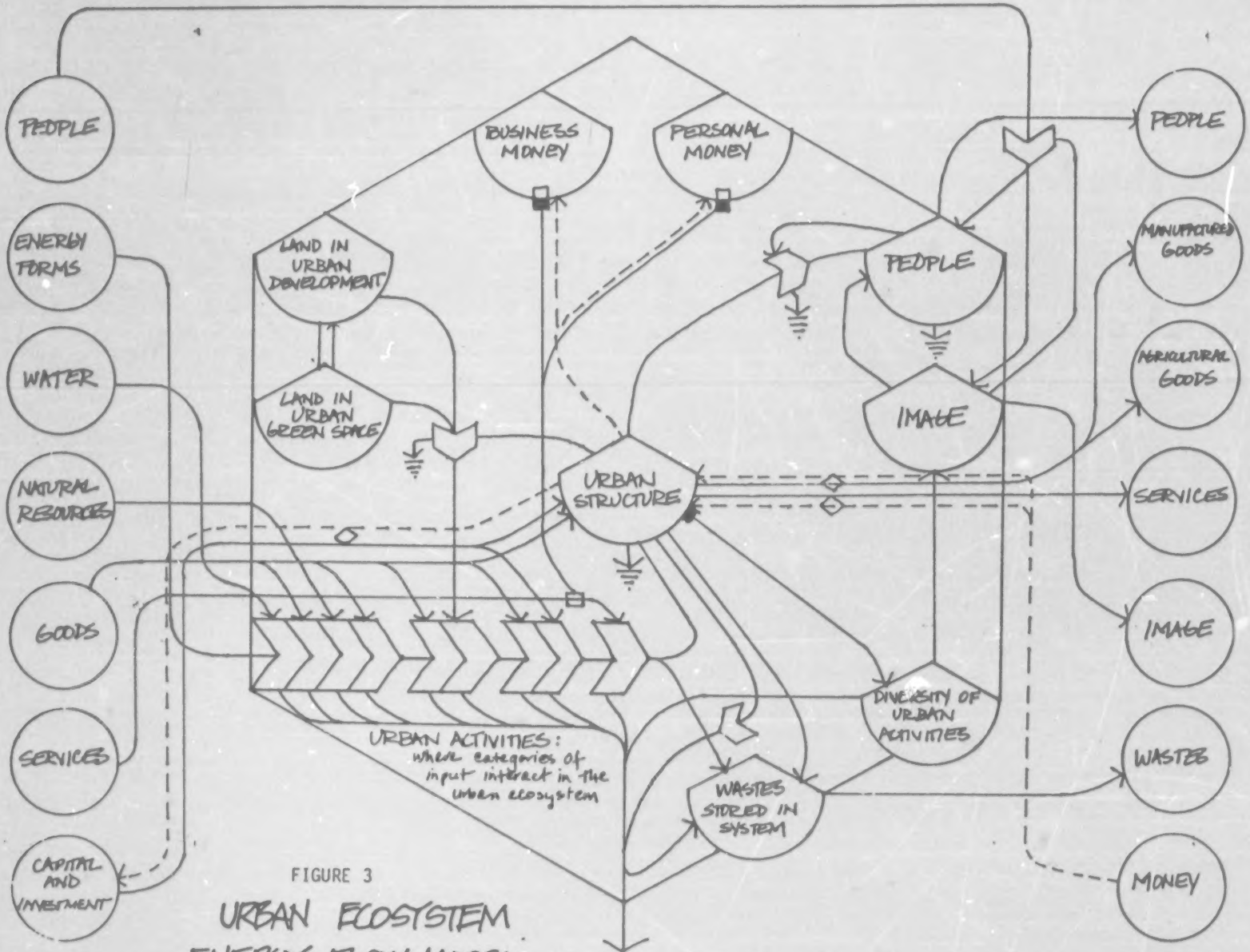


FIGURE 3

URBAN ECOSYSTEM ENERGY FLOW MODEL

ACTIVITIES

FACILITATING NOTES

For Activity I, p. 77, read through directions for the exercise together. Make certain the group is clear as to the purpose of the activity, the steps involved, and the terminology (input, output, etc.). The group should decide on a system to diagram, making sure all group members understand each step in the construction of the diagram.

For Activity III, p. 80, help each other derive examples from personal experiences in response to question #1. This discussion will be helpful in the sections which follow.

OBJECTIVE: (e) Understand the basic principles of energetics

TO DO: This activity is a group exercise to help you apply the principles and concepts of systemics and energetics to a "real" system. In this exercise, you will use the energy symbols introduced on page 62 to construct an energy flow diagram.

Based on the energy diagram of a community food business on page 63, we have classified elements of this system as:

inputs or resources	storages	consumers	producers	outputs
air water sun people foods imported goods money	people business banks	people business	people	foods services wastes recycled goods

1. Choose a specific system to diagram--one that shows energy flows and movement of resources, for instance: a school, a household, or a fast-food business.

2. Define the boundaries of the system--not necessarily spatial boundaries but ones that include input and output of the system.

3. List 10-15 of the most important variables of the system, including both components (nouns), such as "hamburgers," and processes (verbs), such as "eating."

4. Determine which of these are:

inputs or resources	storages	consumers	producers	outputs

Make sure that all are at the same level of detail. Look closely at each producer unit to make sure all inputs and outputs are included.

5. Arrange energy symbols into a diagram. Check for "reality" and completeness by making sure you have represented all necessary energies: materials, information, heat sinks, and wastes, etc.

6. Note which inputs represent renewable or non-renewable energy resources.

A Suggestion. . .

In developing your energy diagram, it is important to consider the implications of energy flows through it. This requires more than simply drawing lines between the elements. Every line represents a process, and every process has a direction and creates differences in net energy. It is important to notice the effects of alternative energy pathways on the system you choose.

This network of processes also reflects many choices not made. The true costs of the network can only be assessed in relation to the costs of the options. The networks that these options generate must be traced, and in the process, the factors that have contributed to these choices may be made evident. Often these factors will relate to resource or economic efficiency. Sometimes they will reflect political, social, or cultural factors only indirectly related to efficient resource use.

OBJECTIVE: (f) Understand a framework for examining the structure of the urban place.

TO DO: Using the matrix below, give some examples of each Ekistics component for different areas. Explain how these examples are related to each other: which networks connect specific examples of different components? Indicate which category of networks each belongs to. (See pp. 65-66)

Ekistics Examples →	A Household	Your Neighborhood	Your Urban Area	Your Region
Ekistics Components ↓				
Nature	household yard, garden	neighborhood park	surrounding hills, water	mountain ranges, river system
Man	myself (or Mom or Betty Lou)			
Society	my family			
Shells	house and workshop			
Networks	foot paths speaking yelling electricity			

OBJECTIVE: (g) Understand some "driving functions" which supply the energy for urban growth.

READINGS: Stearns, Forrest and Tom Montag, ed. The Urban Ecosystem: A Holistic Approach, 1974, pp. 85-111.

Havlick, Spenser. The Urban Organism, 1974, pp. 35-45.

TO DO: Complete the readings, review the section text, and answer the following questions.

1. What kinds of networks are observable in a city, and how can they create problems for public participation? Have you had any personal experiences with trying to resolve networks in your community? What were they?

2. What are some determinants of urban population size?

3. How do "driving functions" affect the development of urban form?

4. Discuss the relationships between the four historical city patterns (refer to Section 1.b.) and some "driving functions."

SECTION 4

SECTION 4

RESOURCES

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SECTION 4

ENERGY REQUIREMENTS OF THE URBAN ECOSYSTEM

After completing Section 4, you will:

(h) Understand types of energy requirements of an urban ecosystem.

(i) Understand resource delivery means for satisfying the urban ecosystem's energy requirements.

We have explored some concepts of energetics and we have introduced the notion of the urban energy "driving functions" which help shape the growth patterns of cities. But what happens to this energy as it becomes part of the urban ecosystem? Where is it needed? What is it used for?

In this section we outline the energy needs of the urban ecosystem. We also introduce some stages in the energy resource delivery system--this system transforms energy resources into energy products useful in satisfying urban energy requirements.

We have described the city as an ecosystemic entity. To further extend the comparison with living systems, we need to explore what the system needs to keep its metabolism running. Often, as we have seen, the urban metabolism uses energies not only for maintenance and reconstruction of damaged parts, but for growth of the organism.

a. Types of Urban Energy Requirements

ENERGY COST VARIABLES

The city uses energy resources for specific components. Energy cost variables are a way of calculating the net energy of each operation and determining the total energy costs to the system. The energy quality required to perform these operations varies with the activity.

Examples of energy cost variables to the urban ecosystem include:[2]

(1) Energy used to construct new facilities--the buildings, streets, water supply, electrical generation and distribution system, sewage disposal system, fixed transportation network (trains, subways), telephone and signal systems, and all the other necessary fixed construction, including those "inefficient" or temporary systems that serve for a while and are replaced by newer ones (such as gasoline stations, sewer pipes, or detours):
    land costs
    building materials costs
    labor costs

[2] Stein, Architecture and Energy, p. 89.

(2) Energy to operate and maintain services and structures, both from inside and outside, as far away as utility plants and reservoirs:
police and fire protection
public health and sanitation
upkeep and repair to urban structures

(3) Energy to transport occupants and users of the city to and from, both within and outside, including transportation energy expended in daily tasks and employment.
roads
transportation means
fuel

(4) Total energy losses of these operations
heat
physical waste
degradation

Energy quality/energy quantity relationships can be examined in terms of the ratio between energy input and output...or how well the results satisfy urban requirements. Two basic considerations when analyzing this relationship are:

Energy flow: the magnitude of energy flowing in a system per unit of time: for example, kilocalories/day.

Population density: the number of people per unit of land area and the resulting building density which has to be fed: for example, 100 people/acre.

ENERGY RESOURCES

Human needs in the urban setting draw upon two types of primary energy resources:

Non-renewable	Renewable
A quantity of finite reserves that are made available to society as a function of available technology and capital investment.[3]	Infinite reserves are available at specific rates to humanity depending upon specific locale; their availability as an energy resource is also a function of available technology and capital investment.

The following chart shows renewable and non-renewable primary energy resources.

NON-RENEWABLE PRIMARY ENERGY RESOURCES	RENEWABLE PRIMARY ENERGY RESOURCES	
Petroleum	Solar	Radiant Solar Heat Photovoltaic Conversion
Natural Gas	Hydrological	Fresh Water Hydroelectric
Coal	Oceanographic	Tidal Temperature Gradient
Fissionable Materials	Geothermal	Steam Heat
	Wind	
	Life Forms	Human Photosynthesis Forests
	Solid Waste	

[3] Lovins, Amory, "Energy Strategy: The Road Not Taken," Foreign Affairs, Vol. 55, No. 1, October, 1976, pp. 65-96.

b. Energy Delivery to the City

STAGES OF ENERGY DELIVERY

To satisfy its appetite for energy, the urban system require some means of transforming and transporting energy resources. The series of processes needed to change a raw resource, such as fuel, into useful work is called an energy delivery system. A chart of the general organization of an energy delivery system follows.

Not all delivery systems require all the steps shown to produce useful end products. But those energy sources that require upgrading in order to become high quality fuel will require at least these steps.

As energy moves through an energy delivery system, there is an increase in energy quality (see Energy Quality, page 55). At each stage in the delivery system the resource upgrades to result in a more concentrated energy form. However, energy degradation or physical loss can also occur at each stage. For example, when fossil fuels are burned to generate electricity, 2/3 of the energy released is lost within the confines of the power plant as waste heat.

END USE

Each end use for which the final energy form is designated requires a different energy quality, depending on its particular function in the urban energy system.

Examples of final energy products for distribution to end use in the urban ecosystem include:

fresh water	fuel oil
electricity	natural and liquified gas
gasoline	human work
information	

The general organization of energy delivery systems has eight stages from primary resource site to end use:

STAGE	SAMPLE ENERGY DELIVERY SYSTEMS	
	OIL TO ELECTRICITY	WHEAT TO BREAD
1. EXPLORATION: siting of resource deposits, basic research and development of exploratory techniques, machinery	Geologic exploration for oil	Agricultural chemist's search for improved method of wheat production
2. EXTRACTION: removing the resource, machinery and site equipment, materials, operating agencies, maintenance over the life of the site	Tapping oil well	Harvesting wheat
3. TRANSPORT I: transportation mechanisms and operating energy necessary to carry the resource to the next facility	Shipment of crude oil	Trucking of grain
4. PROCESSING: energy to run machinery, construction of the facility, its maintenance and operating energies	Processing of crude oil	Grinding of grain
5. TRANSPORT II: transportation systems and the operating energies required to move the resource to the conversion plant	Shipment of partially refined oil to a regional refinery	Trucking of flour to baker
6. CONVERSION: plant construction, materials and maintenance	Transformation of oil into electricity	Transformation of dough into bread
7. DISTRIBUTION: energy costs, equipment, storage facilities and networks to move the converted product from final facility to point of consumption	Sale of electricity to a household	Sale of bread at grocery store
8. END USE: Input to the "basic human needs" system	Operate electric toaster	Eat the bread

c. Resources: A Scenario

We tend to think, as we flick on a lightswitch or open a can of dog food, that that is all we are doing. But according to a primary rule of ecosystems, everything is connected to everything else. The use of any resource is not an isolated act, but a node on a network of many other processes and consequences. Each node represents a choice, explicit or implicit, exercised somewhere, by someone.

Consider, for example, the can of dog food, and some of the energy and resource uses and options it represents.

> Natural gas is used to synthesize nitrogen fertilizer, which is applied to cropland, that grows grain to feed livestock. Beef is slaughtered and shipped to the dog food manufacturer, who processes it, ships it on to a wholesale depot, from which it is distributed to a retail store. A consumer purchases the product, brings it home, opens and empties the can, and throws it away. Garbage service transports the can to the landfill, while the dog deposits its wastes in the street, the yard, or the surrounding countryside.

The energy costs of this pathway are quite apparent: manufacture of products; transport of materials, grain and beef; operation of machinery and equipment. Environmental costs may be evident as well. Before going on, try to list all the energy and environmental costs of this network that you can think of.

For example, the decision to own a dog in the first place is needed to set this chain into operation. Feeding cattle on the range instead of in central feedlots may reduce problems of waste management and consequently, some of the energy costs of beef production, but may alter transportation energy costs. Transportation of products by rail could represent considerable energy savings. However, truck freight has been favored by the federally subsidized interstate highway system. The manufacturer might purchase electricity, from a public utility rather than practice cogeneration of power (i.e., generating electricity on-site and using waste heat from that process to also meet heating needs). Energy costs and utility rate structures have contributed to the growing shift to cogeneration.

The product might be brought home from the store on foot, in private cars, or on public transport, with different energy costs in each case. But urban development in the age of the automobile has often resulted in such a dispersion of activity and shopping centers that travel other than by car is impractical.

The can might be opened by hand, rather than with an electric can opener. The electricity, in turn, could be obtained from fossil fuels, nuclear or solar energy, or hydroelectric power.

Finally, the can might be recycled, instead of dumped, thus reducing the energy required to produce a new can. Recycling not only reduces the resources needed, it also eliminates the problems of residual wastes left behind.

ACTIVITIES

FACILITATING NOTES

For Activity II, p. 94, it may be useful to make copies of the Urban Ecosystem Energy Flow Model (Fig. 3), for the group to write on if teachers don't want to write on their module copies. One person in the group might draw out the diagram on a blackboard or large sheet of paper to provide the group with a common visual stimulus to facilitate their discussion.

OBJECTIVE: (h) Understand some types of energy requirements of an urban ecosystem

READINGS: Miller, G. Tyler. Living in the Environment: Concepts, Problems, and Alternatives. 1975, Chart 11-2, p. 182; Chart 11-3, p. 183.

Odum, Howard, and Elisabeth C. Odum. Energy Basis for Man and Nature. 1976, Ch. 10, pp. 151-163.

TO DO:

1. What are some relationships between "energy cost variables" and stimuli for economic growth?

2. Discuss the development of urban energy requirements in relation to the allocation of various resources. For example, what types of resources are required for the following stages of urban growth: rural towns, industrialized cities, high density cities?

3. Refer to the charts in Miller, and pp. 161-163 in Odum. How are the components of Miller's charts reflected in Odum's descriptions of "environmental stress?"

OBJECTIVE:	(i)	Understand some resource delivery means for satisfying the energy requirements of the urban ecosystem.

READING: Havlick, Spenser. The Urban Organism, 1974, Chapter 1, pp. 27-30.

TO DO: Using the Urban cosystem Energy Flow Model (Fig. 3 in SECTION 3) account for the types of energy cost variables found in the city (p. 73):

1. Indicate where on the flow model the urban energy cost variables can be located, using the numbers on p. 84.

2. Indicate which energy resources (p. 84) can satisfy urban energy requirements by writing these at the appropriate places on the diagram. Use only requirements (1), (2), and (3).

3. Discuss which stages in the Energy Delivery System are represented by the Energy Flow Model. What steps are not accounted for? How can you account for these steps in relation to the Urban Ecosystem Energy Model? e.g., are these stages outside the system?

4. Refer to Havlick, p. 27. Elaborate on the Urban Ecosystem Energy Flow Model by adding the different urban producers and consumers from Figure 1-22 to appropriate components. Remember that, apart from also being urban systems themselves, these producers and consumers are mainly associated with specific inputs or outputs.

SECTION 5

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SECTION 5

RESOURCES

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SECTION 5

QUALITY OF LIFE IN THE URBAN PLACE

After completing Section 5, you will:

(j) Understand a general definition of quality of life.

(k) Become familiar with tools for examining the quality of the urban ecosystem.

Since people first began to form communities, they have had many ideas about the nature of the "good life," depending on their environment and their values. At times, simple survival seemed enough, but when complex societies began to evolve, sophisticated ideas about what constitutes a quality existence also developed. Today, when a rapidly changing technology and culture seem to bring as many new problems as solutions, people have recognized the need for a dependable method of assessing the value and effect of the different facets of their existence in relation to the state of the entire system. In this section, we will introduce the notion of Quality of Life, and discuss some categories of information which we can use to explore this concept.

We have examined in detail the basic characteristics and patterns of the urban ecosystem. The purpose of this lengthy examination has been to establish an understanding of how the processes of the city work--how we, as humans, affect the manner in which energy, material, and information interconnect and flow through the urban ecosystem, and how this ecosystem, in turn, affects us. We have taken the stance that this structure and its processes are formed by certain "driving functions," and that the resultant patterns of growth and change are observable.

The goal of this study has not simply been to learn about urban patterns, but rather to be able to improve our living conditions, by taking into account the processes of energetics and the possible "free work of nature." We can make an effort to adjust certain individual, social, and institutional relationships in the urban structure and process. We can affect public policy by intervening knowledgeably and effectively in urban energy flows. Public policy-making has been and can be challenged to establish programs and allocate resources that significantly affect the lives of different groups of people in many different ways.

QUALITY OF LIFE CONCEPT

To meet this challenge, the concept of "quality of life" has been rapidly developing among urban dwellers and policy-makers. General definition of quality of life equates the term with the older terms "general welfare," or "social well-being." The National Environmental Policy Act expands on

this human-centered definition by mandating the Federal Government to take action "in protecting and enhancing the quality of the nation's environment to sustain and enrich human life."*

Outside of this general definition, there are as many quality of life definitions as there are people. Most people approach the notion of quality of life with preconceived definitions which vary greatly with respect to the time, the place, and the individual.

The quality of life concept has become a focal point for merging social, economic, political, and environmental considerations. Numerous attempts are being made to seriously develop the concept into a useful tool for decision-makers in public and private sectors of society. Although the quality of life concept can be described in various terms, depending on one's perspective, and location in time and space, it is a multidimensional integrative concept. In urban situations, it is this multidimensionality which provides a way for citizens and institutions to come together in decision-making for mutual benefit.

Local governments, as well as State and Federal agencies are recognizing that they must involve themselves heavily with a wide variety of social and environmental conditions which affect ou- quality of life. These include the health of the population, equal opportunity among individuals, the

*Liu, Ben-Chieh, Quality of Life Indicators in U. S. Metropolitan Areas, 1970, prepared for the Washington Environmental Research Center, U. S. Environmental Protection Agency, Washington, DC, May 7, 1975, p. 9-10.

eradication of poverty and discrimination, more security for the aged, more equal distribution of incomes and resources, urban housing, transportation systems, pollution control, and citizen participation.

a. Tools for Examining Quality of Life

In order to promote the overall quality of life, there is an urgent need to define the quality of life by identifying factors that determine and influence quality of life for individuals and groups. In other words, we need tools that can help us distinguish better from worse. Many surveys and studies have been conducted recently on the quality of life in numerous areas of the United States, at different levels of investigation--state, regional, and local. These studies have common means or tools by which they gather and organize information, even though the types of information gathered vary widely from very narrow investigations to evaluations which are more integrative and deal with the interactions between information areas. These tools of data organization are developed as quality of life indicators.

QUALITY OF LIFE INDICATORS

The search for comprehensive quality of life indicators is an attempt to obtain new information in a new framework that will be useful to evaluate the past, guide the action of the present, and plan the future. Quality of life indicators exhibit complex interactions which can hint at the state of the urban ecosystem and make important statements when seen in relationship to each other. The tools for measuring various levels of quality of life in urban areas are aimed at the indentification of strengths and weaknesses of urban and national health. Thus, public and private decision-makers can be assisted in the evaluation, guidance and planning of a better quality of life.

As their title implies, quality of life indicators are a set of diagnostic tools, pointing to those conditions we choose to define as related to the concept of quality of life in the city system. They are situational variables, meaning that they will change with place, time, and the values of the person or people being surveyed.

SITUATIONAL VARIABLES

For the purposes of this learning module, and specifically related to urban living, we have developed a series of positive quality of life indicators. These positive indicators are relative to the situational variables and their rates of change over time. This type of indicator allows for comparisons over an extended period, so we can observe sharp fluctuations, long-term trends, and check predictions.

POSITIVE INDICATORS

Positive indicators give us a picture of the urban condition in relation to what is considered to be the "right or proper" direction, stressing the environmental attributes that contribute to the improvement of urban quality of life, for example, the sense of community, the increase of protective services, or the cleanliness of the air and water. Negative indicators, on the other hand, are those that are based on what most people consider to be degrading about the environment, or which do not contribute to the improvement of the urban place. Examples of negative indicators are the increase in crime, the inadequacy of fire protection, or the lack of sanitation.

In the next section, we will introduce categories of quality of life indicators and briefly discuss what aspects of the urban condition are covered by each.

b. Quality of Life Indicators

Quality of life indicators fall into five broad subject areas.* Categories for assessment within these areas are outlined below. Some indicators overlap into more than one subject area.

Not all of the indicators which are introduced in the following materials can be used in every urban situation being assessed. We are providing them as clues to interactions between urban elements. These interactions create conditions that we can observe to determine the state of the city system.

We will further discuss the uses of these indicators in the final activity when we present suggestions for gathering and evaluating information and planning alternative strategies for improvement of an urban place.

*Liu, Ben-Chieh. Quality of Life Indicators in U. S. Metropolitan Areas, 1970, p. 12.

FIVE BROAD SUBJECT AREAS FOR EVALUATING
THE QUALITY OF LIFE IN URBAN SITUATIONS

1. Environmental

   Urban Energy Efficiency

   State of the Natural Environment

   Access to Amenities

   Livability of Climate

2. Social

   Access to Amenities

   Citizen Influence and Community Control

3. Health and Educational

   Access to Public Services

   Level of Public Health

4. Political

   Citizen Influence and Community Control

   Access to Public Services

5. Economic

   Economic Opportunity

A brief explanation of each of these subject areas and short newspaper articles exemplifying these urban concerns follow:

(1) Urban Energy Efficiency

Some indicators useful in determining urban energy flows are listed below. Some require calculation to obtain accurate measurements. You should, however, be aware of these as an underlying useful framework for examining the energy requirements of urban structures.

- Energy used to construct new facilities--the buildings, streets, water supply, electrical generation and distribution system, sewage disposal system, fixed transportation network (trains, subways), telephone and signal systems, and all the other necessary fixed construction, including those "inefficient" or temporary systems that serve for a while and are replaced by newer ones:
  - land costs
  - building materials costs
  - labor costs

- Energy to operate and maintain services and structures, both from inside and outside, as far away as utility plants and reservoirs:
  - police and fire protection
  - public health and sanitation
  - upkeep and repair to urban structures

- Energy to transport occupants and users of the city to and from, both within and outside, including transportation energy expended in daily tasks and employment.
  - roads
  - transportation means
  - fuel

- Urban structure Edge Index: the measure of the complexity of urban or building structure. The number of edges in a system has a direct relationship to the power flows necessary to build and maintain them. The number of edges on a structure is a direct measure of the surface area required to be maintained. The energy costs of structures are related to the complexity of shapes in an area.

- Urban Structure Density: a ratio of the volume of useable space of buildings to the area of land they occupy.

- Power Density: the relationship of physical structure to energy consumption. It is determined by the quantity of energy flowing through an area per unit time divided by the spatial area. This includes energy from other subsystems in the form of noise or pollution as well.

- Urban Structure to Open Space Texture: a relative measure, on a large scale, of the urban patterns' internal variability; for example, the texture relationship of built structure to greenery, such as close buildings of varying heights as compared with more regular textures like evenly distributed buildings and open space complexes. Irregular textures require more energy to construct and maintain than regular textures.

- Runoff Index: the percentage of rainfall that appears as runoff. It is a function of slope, surface permeability (cement and asphalt are excellent indicators of runoff), and rainfall intensity. The percentage of water that cannot penetrate through soils to recharge ground water, and the quality of that water are important factors in assessing stress (internal and external) to the ecosystem.

- Total energy losses of these operations to heat.

S.F. Solar Heating Project

By Dale Champion

Under prodding from a team of conservation-minded architects who bucked a set of obsolete code rules, San Francisco building officials have approved a pioneering solar heating project here.

If construction goes according to schedule, five large townhouses built around "passive" sun-heating systems will rise next year at Eddy and Broderick streets, near Kaiser Foundation Hospital.

Each will have a lofty, south-facing greenhouse attached to its rear side for trapping the sun's energy. The collected heat will either flow directly into the rest of the townhouse through a system of vents and ducts or be drawn down to a hot air storage bin — a large concrete box filled with six tons of river rock — for later circulation by a network of ducts.

Although similar cost-saving solar technology has been utilized in other places with less restrictive building codes, it is the first time San Francisco has consented to its use.

The victory over the San Francisco building code belongs to Zoe Works, a small two-year-old architectural firm that does its business from a converted South of Market warehouse at 70 Zoe alley, just off Bryant street.

Garth Collier, the firm's principal architect, is a partner with Dr. James Delameter, a Kaiser physician, in the $500,000 townhouse project, known as Sunhouse. The complex is being built under the auspices of the San Francisco Redevelopment Agency.

"When we first submitted our townhouse designs last August, the city building department turned us down cold," recalled Robert Colyer, 26, an associate in Zoe Works and the project architect. "They said the city building code wouldn't allow our type of solar space heating system."

Before now, the city has allowed the installation of about 15 "active" solar systems, which utilize mechanical equipment — collectors, pumps and piping — to gather, store and distribute the sun's energy. Those systems, mostly in homes, are used for heating hot water or living areas, and the city's concern has been confined to seeing that build code plumbing requirements were met.

It's been a different story, though, for efforts to install systems like the Zoe Works', which is based on "passive" solar design. Under this system, that sunlight is collected and stored through the configuration of the houses themselves, without depending on mechanical equipment.

City Building Superintendent Robert C. Levy originally said there were three "major" objections in rejecting the Zoe Works solar plan.

Basically, he said, the municipal building code has not been modernized to cover passive solar heating systems.

One stumbling block for Zoe Works was the greenhouse, which the townhouse designers intended as not only a solar collector but also as a flexible living area and a route to the back yard. The building code says flatly that "greenhouses shall not be used for habitable purposes."

Levy also mentioned the code's requirement that windows of habitable rooms must open directly to the outside for ventilation. In the Sunhouse complex, two bedrooms, one atop the other, were designed to have windows opening on the greenhouse in order to benefit from its heat as well as its fresh air ventilation system.

Additionally, Levy said, there were no standards for the hot air storage bin, which is buried underground.

While turning down the project, Levy invited Zoe Works to appeal his decision to the city's little known board of building examiners. The five private professionals — architects and engineers — on the board arbitrate disputes over interpretations of the building code.

Zoe Works' Colyer said both the mayor's office and the city planning department indicated they were favorably impressed by the Sunhouse plans.

The energy committee of the Northern California chapter of the American Institute of Architects also supported the innovative complex.

Last week, when the building examiners met in a basement room in City Hall, the Zoe Works architects showed convincingly that their designs complied with the building codes's intent to assure safe, healthful housing conditions.

The greenhouses, the architects argued, are really solariums and therefore can be considered acceptable habitable space under the code.

They also demonstrated that the back bedrooms of the townhouses would get more than adequate fresh air from the greenhouses.

The hot air storage bins passed muster after the Zoe team pointed out that there would be backup heating — either natural gas or electricity — to fill the gap if the solar system should fail to live up to expectations.

Engineering calculations, according to Zoe Works, give the solar system an 87 percent efficiency rating. "That means that averaged over a whole year, the system will be able to keep the townhouses as warm as 70 degrees 87 percent of the time day or night," architect Colyer said. "The rest of the time gas or electrical heating will take over."

He said enough hot air can be contained in the underground storage bin to keep the townhouses comfortably warm through four successive sunless days.

Although several somewhat similar solar systems have been installed in smaller Bay Area communities, the Zoe Works architects said they know of none whose actual heating performance has been measured. They plan to install monitoring equipment in the Sunhouse complex to find out how efficiently its solar systems perform.

Colyer estimated the solar installation costs, including the backup equipment, at $6000 for each townhouse, about twice the price of conventional heating systems.

The solar system, he said, should pay for itself in about 11 years, assuming that natural gas price increases and inflation follow recent patterns.

At present, it would cost $115 a year for the volume of natural gas needed to heat each of the townhouses, which will have nearly 2000 square feet of floor area and are likely to sell for $120,000 to $140,000.

There is plenty of opportunity, Colyer said, to make good use of the Zoe Works solar concepts in other construction here.

San Francisco Chronicle ★ Thurs., Dec. 1, 1977

(2) State of the Natural Environment

The information in this category is very much dependent on the time-frame in which investigation is made. How does the condition of natural resources of high quality relate to what it was 5 years ago? 5 months ago? Not only measurable information is valuable here, but individual judgment about the rates of change in natural environmental quality is important as well, for it is up to people to supervise recovery of resources from the many negative impacts of modern living.

It is necessary to stress the maintenance of the regenerative capacity of the natural system, and humanity's responsibility to foresee the implications of tampering with a system's synchronized "natural" evolution. We must allow a natural system to return to an evolving baseline condition after harmful inputs are discontinued.

Indicators in this category include:

- air quality: eye irritation, effect on breathing, visibility, impairment of visibility, pollution content and control
- water quality: water treatment and availability
- waste disposal: garbage treatment, recycling, sewer conditions, land fill
- noise levels: vibration levels in different places of the city from motor vehicles, construction.
- radiation levels: any nuclear fuel disposal sites nearby?
- pesticide use: in nearby agriculture or in homes
- fuel consumption: types of fuel, waste heat per volume of space or mode of use per fuel per day, per year
- land use: general land use patterns and development
- soils and geography
- renewability of resources
- wildlife and scenic resources: protection, management, parks and recreation areas.
- aesthetics: views of natural features, absence of erosion, tree felling, trash, litter

6 San Francisco Chronicle ★ Tues., Oct. 18, 1977

N.Y. Must Clean Its Air By Limiting Auto Traffic

Washington

The Supreme Court yesterday cleared the way for enforcement of a clean-air plan for New York City that officials claim will jeopardize the city's existence as a commercial center.

The purpose of the plan is to curb automotive air pollution by reducing the use of motor vehicles for travel in and to Manhattan.

The court denied pleas by Mayor Abraham Beame and Governor Hugh Carey for review of a ruling that upheld the plan.

One of the city's complaints was that the plan was the product of an "unauthorized pact" devised by former Mayor John Lindsay and former Governor Nelson Rockefeller in the knowledge that it wouldn't take effect until after they had left office.

The federal Environmental Protection Agency approved the plan in June, 1973. Its major features included tolls on 11 bridges across the Harlem and East rivers, restrictions on taxi cruising, elimination of both on-street and off-street parking in certain sectors and on-street parking in the mid-town core and a ban on freight deliveries during business hours.

The predicted result — a 50 per cent reduction in vehicle entry into Manhattan by 1980 — would be "disastrous" the city told the Supreme Court.

The city termed the bridges "literally and figuratively the arteries of the city's commerce." Tolls would cause "massive traffic snarls and potential loss of valuable real estate" that would be needed for toll plazas, the city argued.

Seventeen months after the EPA approved the plan Friends of the Earth and other environmental groups sued for a federal court order to compel complaince.

Counsel for the state acknowledged that the plan was "legally enforceable" and "legally adequate" — and also that officials apparently had no intention of implementing certain parts of it. "If there is a legal ground for such a refusal, we have not been able to find it," he told the court.

After the court first rebuffed the environmental groups, and after a good deal more litigating, the U.S. Circuit Court of Appeals ruled for them last January.

Washington Post

Legislature Passes Anti-Litter Tax

By Larry Liebert
Chronicle Correspondent

Sacramento

A new tax on every store, factory and wholesaler in California was voted by the Legislature yesterday to create a $17-million-a-year fund for recycling.

By accepting Assembly amendments, the Senate gave the anti-litter measure final approval on a vote of 29 to 4. The measure's author, Senator John Nejedly (Rep-Walnut Creek) said he expects Governor Brown to sign it despite Brown's often-repeated distaste for new taxes.

Leading industires supported Nejedly's approach to litter control. But environmentalists have been lukewarm toward it — they felt it was being used to defeat a more stringent measure that would have banned all no-return containers.

Nejedly's measure would subsidize a variety of programs — state and local, public and private — to recycle containers and paper and to clean up litter.

Most of the money would come from a new tax on every company, that makes, distributes or retails a product. Shops and other retail businesses would be taxed from $10 to $30 annually, depending on their volume of business.

Most manufacturers and wholesalers would pay from $25 to $1000 a year, depending on their number of employees. But the tax would go higher — as high as $2000 a year — for manufacturers and distributors of products considered the worst litter-causers. Products put in the higher tax category include soft drinks and beer, newspapers and magazines, household paper products, wrappers and tires.

Significantly, lobbyists for wine and hard liquor managed to keep their products from being included in the more highly-taxed category.

Another provision of the Nejedly measure would create a tax of 25 cents for every ton of solid waste dumped in a landfill in a metropolitan area. It would also require service stations, groceries and fast-food outlets to maintain litter cans.

Nejedly portrayed his measure as better than the ban on no-return containers which lost in the Legislature earlier this year. He said his approach offered "a comprehensive state solid waste program."

But Senator Omer Rains (Dem-Ventura), sponsor of the no-return ban, charged Nejedly's bill would only "mop up" litter after it is created, rather than eliminating the "throwaway ethic."

Rains charged that business had "embraced" Nejedly's measure only to derail "more meaningful" controls on litter. He charged it would "hypocritical" for Brown to sign the bill because the new tax would be passed on to consumers.

20 San Francisco Chronicle

Thurs., Sept. 15, 1977

(3) Access to Amenities

In Section 2 we examined the relationship of human needs to urban patterns. Beyond the necessities for survival, there is the need for physical and psychological access to those aspects of the environment which improve living conditions and increase "peace of mind." This is even more necessary in an urban environment than in a less pressured rural setting.

Indicators in this category include:

- density patterns: city size and population density--dwelling units per acre, level of residential crowding, visual privacy

  architectural density--land coverage per unit, developed area per acre

  open space, texture, tree cover and other vegetation per developed area

- quality of built environment: housing standards, affordable housing

  energy-use efficiency of buildings

  adequate and available public buildings

  quality of materials, landscaping

- cultural opportunities: diversity and availability of activities and affordability

- recreation and open space: access to rural/non-urban areas

  availability of outdoor facilities

  quality of recreational facilities, parks, urban greenery, urban gardens

- aesthetics: use of "genus loci"--respect for the natural attributes of the area

  visual access to natural and/or pleasing views

  differentiation, uniqueness, diversity of city structure

- convenience: access from one facility to another, access to desired facilities, groupings of public facilities

- lack of environmental dominance, oppressive structures, barriers, walls

- adaptability of people and places to unforeseen change and growth, technological and other innovations, travel changes, lifestyle changes

A Plan for a Mountain Park in L.A.

By Robert A. Jones
Los Angeles Times

Los Angeles

THE SANTA Monica mountains begin in Los Angeles and run westward for about 50 miles, through Hollywood, then Beverly Hills and finally into wilderness above the Malibu coast.

They are neither the highest nor the most spectacular mountains in this country; in fact, they are not even close. But in one sense the Santa Monicas are unique: They are the only mountain range in this country to bisect a major American city.

Though most of the range has been heavily developed — the Hollywood Hills, for example, are part of the system — the Santa Monicas still contain huge sections of open land, chaparral-covered hills, canyons filled with groves of live oaks, savannahs and mountain meadows. For 20 years the idea of a national park in the mountains has been promoted by conservationists and several government agencies. And for 20 years the idea has met with frustration and failure.

★ ★ ★

WHILE OTHER cities, most notably San Francisco and New York, have acquired large federal parks within or near their borders, efforts in Los Angeles have been stymied. A major problem has been price. Congress on several occasions has looked at the projected cost — now estimated at $100 million — and sent the park supporters home with their plans in their lap.

But now, almost unexpectedly, the Santa Monica mountains have become one of the hottest federal park prospects in the nation. An ambitious proposal for a national park and seashore has been submitted by Representative Anthony Beilenson (Dem-Calif.), and conservation organizations are predicting that some form of the bill will be passed by Congress next year. Perhaps more importantly, several key congressmen agree.

"I think it's gonna go," said Representative Philip Burton (Dem-Calif.), chairman of the House subcommittee on parks and insular affairs. "We have this valuable open space in Los Angeles, it's right there waiting for us, and we should move as quickly as we can to preserve it. The mountains won't stay unspoiled forever."

IN ITS present form, Beilson's proposal would establish the Channel Islands and Santa Monica Mountains National Park and Seashore. Though no acreage figure is specified in the bill, it has been estimated that 30,000 to 40,000 acres would be acquired on the mainland using $100 million authorized by the bill.

Another $50 million would be used to acquire Santa Cruz and Santa Rosa islands in the Santa Barbara Channel. The bill currently has 31 cosponsors in the House, and similar legislation has been submitted in the Senate by Senator Alan Cranston (Dem-Calif.).

According to Beilenson, the national park also would incorporate the 27,000 acres of three existing state parks — Malibu Creek, Topanga and Point Mugu — established in the Santa Monicas over the past decade. With the combined federal acquisitions and state parks, the total mainland acreage in the national park could reach 70,000 acres.

With the exception of the state parks, all lands for the park would be acquired from private holdings. While no precise boundaries have been established, conservationists have estimated land costs at $1000 to $4000 per acre.

★ ★ ★

ONCE CONSIDERED — and still thought by some — to be a region of dusty roads and impenetrable, brush-covered hills, the Santa Monicas are increasingly recognized as a far more complex area. The oak-covered canyons can offer refuge from the summer heat; the open savannahs are often warm and sunny, even in the winter when other recreation areas are closed.

"Most people get their impression of the mountains from driving along the major roads. Unfortunately these roads pass through some of the least-interesting areas," said Joseph Edmiston, executive director of the Santa Monica Mountain Planning Commission. "You have to get off the roads to appreciate the real quality of the mountains."

Amazingly, some of the mountain areas remain nearly pure wilderness, even though they may be less than an hour's drive from six million people.

S.F. Sunday Examiner & Chronicle, Sunday Punch, December 25, 1977

(4) Livability of Climate

Any information in this category must be considered in relation to personal and cultural preferences about what is a healthy, comfortable place to live. Humanity has had to make adjustments to all but the most temperate climates by building protective structures and altering modes of transportation and dress. Therefore, the process of looking at these indicators can give you information relative to your own and/or your group's likes, dislikes, desires and preferences for climate.

Indicators in this category can include:

- ratio of temperature per days of the year--"degree/days"
- ratio of sunny to overcast days (rainy, foggy, snowy)
- ratio of temperature to humidity (sometimes called "comfort index")
- relationship of wind to temperature ("wind-chill factors")
- inches of precipitation per time period and/or season
- drought conditions--reservoir, capacity, ground water table levels
- number of frost-free days--indicator of growing season

Some changes in the climate of the city and its sections can be traced to human-induced physical structure, i.e., building patterns.

Indicators of these changes include:

- temperature changes--due to landfill or bodies of water, or the "stacking effect;" seen in the ratio of a building's or an area's heat absorption to its heat dissipation.
- wind pattern changes
- changes in sun/shade ratios
- ease or difficulty in getting city greenery to survive in relation to asphalt, air pollution, water conditions

Contra Costa Times Wednesday, January 18, 1978

CC Rainfall Patterns Remain Fluid

By STEVE HAWKINS
Assistant City Editor

MARTINEZ — The only thing predictable about Mother Nature is that she is always unpredictable.

Ninety years of Walnut Creek rainfall records prove it.

Rainfall ranged from 7.10 inches in the driest year (1923-24) to 36.21 inches in the wettest (1957-58) in no discernible pattern.

According to statistics compiled by the county Public Works Department, Flood Control District, the 1975-76 and 1976-77 rainfall seasons (from July 1 to June 30) were the two driest consecutive years in Walnut Creek — and probably Contra Costa — history.

Total rainfall for the drought years was 17.54 inches. Normal seasonal rainfall for Walnut Creek, according to a computer average, is 19.70 inches.

County employes Lou Hurley of Concord and Paul Wu of Martinez have come up with "reliably accurate" rainfall totals for the county based on years of collected data.

With more than 40 stations throughout the county, half of which actively record rainfall data, the county's rainfall totals are closely watched.

Records extend as far back as 1879 for Antioch and 1887 for Walnut Creek. In some cases, precise data is missing, but the computer is able to fill in the gaps based on the extensive data it has received.

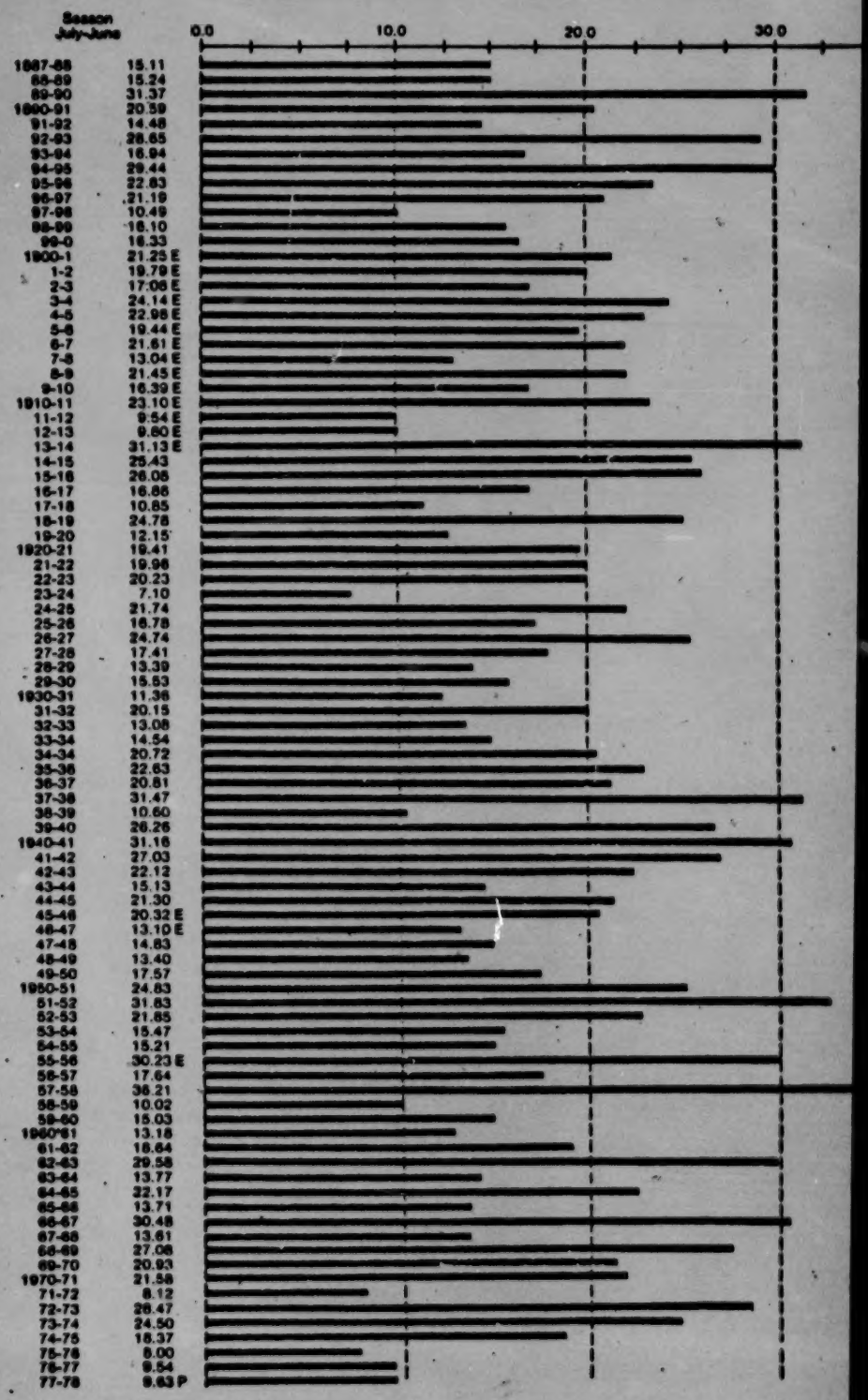
Walnut Creek's driest season was preceded and followed by slightly above normal rainfall (see accompanying diagram) at 20.23 inches in 1922-23 and 21.74 inches in 1924-25, alleviating the compound affects that experienced in the past two years.

Records indicate that two consecutive below normal rainfall seasons did occur in 1911-12 and 1912-13. Totals listed for those years are 9.54 and 9.80 respectively.

The following 1913-14 season, however, drenched Walnut Creek with 31.13 inches of rain.

But the most obvious fact about Walnut Creek's rainfall history is that there is no pattern — nature is always unpredictable.

Besides providing an interesting record of Contra Costa weather history, county records are primarily used to determine "design criteria" for county engineers.



E-Estimated Data Involved

(5) Citizen Influence and Community Control

The indicators within this category are probably the most varied, as the idea of "neighborhood" and "community" are fairly broad concepts. This category also includes those elements that make up social freedom and the degree of citizen input into government and its effectiveness on public policy.

Indicators in this category can include:

- civil liberties: freedom of choice in social structure, freedom to move around, diversity of lifestyles, diversity of people, privacy, adequate territory per person, per group

- citizen participation in political activity: right to vote, right to hold office, voter registration; type of elections, how often, what levels, presence of third parties; write-in candidates; financing of campaigns, political activity outside traditional areas--consumer groups, volunteer organizations; local control of issues involving community, local land use control, sense of personal control; recall elections, public initiatives

- access to government: access to information, honest and fair representation, access to government officials

- legal aid availability: just treatment, court backlog, judicial reversals, access to diverse legal resources

- sense of security: adequate protection services, enforcement of safety regulations, traffic patterns

- tradition and historical aspects: sense of history of community, resilience to changes, respect for cultural heritage of community, festivities, spontaneous events

- communication for informed citizenry: newspapers, local publications, other communication media, success of local businesses, public opinion polls

- social environment: "neighborliness," friendliness of people, social interaction with like and unlike groups, lack of prejudice, personal identification with community

- community facilities: availability and use of community centers, projects, play spaces, parks, libraries, civic-sponsored improvements

So far, so good

The proposal to locate a community auditorium, plus a convention facility which might also be used for many community functions, on two blocks at the north end of Willamette Street makes good sense from almost every angle.

This downtown location offers important access and egress, parking and economic advantages. Its use also would advance the rebuilding and modernization of the core area, which has already attracted national notice, and add to the esthetic appeal and livability of the central city.

But don't expect a new auditorium and related structures to rise there overnight.

The downtown site, bounded by Oak and Olive Streets between Sixth and Seventh Avenues, was the first choice of consultants hired by the city and also of an impressive majority of citizens testifying at hearings involving 16 other possible choices.

This should make it easy for the city council when its own special "civic center" citizens' commission, headed by former Mayor Les Anderson, formally asks for approval of the location just a block north of the downtown mall.

Nonetheless, the 15-member commission's work will really just be beginning if, as is fully expected, the council endorses the site next week.

What was for years known as the "civic auditorium project," and, in our opinion, still should be, has a long way to go. It has yet to be developed as more than a general concept. Accordingly, it is hard for the public to even begin to visualize what a combination of performing arts and large meeting facilities might look like with Skinner Butte as a backdrop — or to make any more than tentative judgments about their operation.

Only schematics of the auditorium-convention project have been worked out to date, and some of those may be subject to change. At this point, the project probably will include a small theater with seating for about 500, a larger theater-concert hall designed to seat about 2,500 and accommodations for large meetings and conventions.

The Civic Center Commission, which we understand is considering a name change to better identify its sphere of concerns, has set those principal objectives after a lengthy process of public consultations and of measuring community needs through professionally conducted studies.

Next comes the time for "firming up" the project plans, taking into consideration such practical concerns as dovetailing them as sensibly as possible with planning for new, and in some ways similar, buildings that are to be built at the county fairgrounds.

The city council, which has properly taken final authority over the auditorium-convention center project, has selected a nationally known firm to do the architectural designing, assisted by a local firm. The council also has hired an experienced project director to advise the citizens' commission.

It is the commission, however, that will have the ball back in its court once the site selection process has been completed. It will be up to its members to inspect operating civic auditorium-convention center layouts in other West Coast cities and otherwise become deeply involved in the work of developing recommendations for Eugene's ultimate project.

One complication has been removed by the abandonment of a proposal to build a major indoor sports arena, principally for University of Oregon basketball games, in conjunction with the auditorium-convention center. This has re-established the civic auditorium project as the city's foremost concern, and, among other things, has facilitated the site selection.

No doubt there will be a lull in news from the auditorium-convention center front now that the "where" question is virtually settled. The next reports, on "what" actually will be proposed and "how" the project will take tangible form will be awaited with growing community anticipation.

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(6) Access to Public Services

The mass of data that can be obtained in this category is valuable only when examined in relation to the non-measurable factors of individual or group satisfaction within a given time. It is necessary not only to look at the extent of services offered, but also at the ratio of those used to those offered--how much, by whom, and when. It is only by evaluating citizen satisfaction that comprehensive public policy for service delivery can be formed.

Indicators in this category can include:

- diversity of services and facilities and evenness of distribution; availability of retail services, banks, savings and loan associations
- quality of services and facilities
- communication about services: for what, to whom, when
- communication services: newspapers, telephone, radio and television availability
- water: availability, quality and cost of services; quality of treatment facilities
- utilities: sources (coal, hydro-electric, solar, nuclear, natural gas); energy efficiency; cost and reliability--acceptable power rates and public input and/or control
- waste disposal: recycling, garbage pick-up, sewage treatment and effectiveness, water pollution levels
- street maintenance services
- commercial services: quality and safety of products, food and drugs
- protection and aid services: availability and use of ambulance, police, fire services; crime rate; prison quality, expenditures on services per capita
- education: expenditures per student, availability, diversity of programs; effectiveness of programs; literacy levels; library availability and use, employment/education ratio
- transportation: safety, speed, quality, privacy, cost, availability of various modes of transport for different sectors of population
- federal/state assistance for public services

Page 6A REGISTER-GUARD, Eugene, Ore., Friday, November 18, 1977

Springfield C of C invited to explain transportation

By CLARK WALWORTH
Of the Register-Guard

The Springfield Area Chamber of Commerce has been invited to spend an evening with Bill Morrisette to explain its position on mass transportation use goals.

Morrisette, a Springfield teacher who is a candidate for the Springfield district seat on the reorganized Lane County Board of Commissioners, issued the challenge during a Thursday night speech to the McKenzieland Democrats.

The mass transit goal is one developed for the Eugene-Springfield Area 2000 Transportation plan, called T-2000, which is being discussed by governmental agencies.

Morrisette claimed the chamber of commerce at one time publicly favored setting the city's goal of having 10 percent of all individual trips made by some form of mass transportation but later was instrumental in the Springfield City Council's decision in March to reduce the goal to five percent. The T-2000 plan report characterizes that figure as "not compatible with the Eugene and Lane County goals."

Morrisette says he wants to know why the chamber has taken this position and and has invited Robert, Naslund, chamber of commerce president-elect; Ollie Snowden, transportation coordinator for the Lane Council of Governments, and council members John Lively and Gene Davis to join him in a panel discussion on the issue Dec. 10. He said he has reserved a room in the Springfield Utility Board building.

"I publicly challenge them to make a statement — to clarify their positon, so we can have a discussion before we have to make a final decision on this," he told the meeting of Democrats.

The mass transit-use goal affects the amount of money spent on improvement projects through the T-2000 plan, he said, and because Eugene and Lane County have set higher goals, Springfield won't get much of that money. Eugene has adopted a goal of 15 percent and Lane County has set a goal of 10 to 15 percent.

Springfield's mass transit-use is at about three percent now, and Morrisette said he is puzzled by the chamber's statement that a goal of five percent by the year 2000 is unreasonable.

"I don't understand it, and I'd like to know why," he said. "I think the public deserves an explanation."

The city needs to concentrate on such alternatives to highway transportation as bike paths and improved sidewalks, he said. "I don't know how we're going to avoid a calamity if we don't start making some arrangements."

Other issues Morrisette discussed included the idea of establishing a "dry port" in Lane County by expanding Mahlon Sweet Airport and by letting the Eugene area become a major West Coast distribution center. The idea is attractive, but it has its drawbacks, Morrisette said.

"It's scary as hell when you think of the other side of the coin," he said. "You have to be very careful about attracting industry." The economic and environmental situations in the area are fragile, he said. He mentioned a housing shortage and the Willamette Valley's airshed as particular problems.

"I'm in favor of strict land-use planning, but we've got to have equity, due process and justice for the people involved."

Morrisette said he disagrees with the concept of reorganizing county government so that department heads are responsible directly to individual commissioners.

"We are laymen," he said. "I am a layman running for office. I am not an expert on the day-to-day activities of the various departments. I think a good chief administrator should be hired. If he doesn't do the job, I think he should be fired. You've got to have some faith in the professional administration."

(7) Level of Public Health

The level of public health is so closely tied with other environmental conditions, that it is hard to find indicators that adequately describe this part of the city system. Especially in American cities, health is relative not only to the absence of disease, but to factors of stress and lifestyle. Therefore, it is helpful to approach the effectiveness of public health services and the state of individual well-being from the perspective of the optimization of the health of mind and body--from a perspective of "holistic" health.

Indicators in this category can include:

- health care: quality, diversity, availability and affordability of services; number and distribution of doctors, dentists, etc., and hospitals per capita; funded health-care programs, senior services, maternity care; response time of ambulances, emergency units, emergency rooms; substance abuse programs (alcohol, drug)

- health education: prevention emphasis, quality and availability of education and prevention programs, halfway houses, effectiveness of substance abuse education

- nutrition: adequate diet, minimum daily requirement met per capita, per area, per household; quality of foodstuffs, food additives, "junk food" statistics--how many MacDonald's and Taco Bells in <u>your</u> neighborhood?

- health hazards: pollution levels, radiation, accident types and accident rates

- amenities: mental health conditions, stress levels due to employment, living situations, noise; use of community facilities, private health clubs, the "Y"

- personal health habits: exercise levels of community

'Junk Foods' Linked to High Blood Pressure

By Charles Petit
Science Correspondent

Newport Beach, Orange County

Experiments with spider monkeys have shown a Louisiana researcher that he can produce high blood pressure in the animals by feeding them a diet not much different than the salt-and-sugar-loaded "junk foods" children love.

The evidence seems to show, said Dr. Gerald S. Berenson of Louisiana State University, that the sugar and salt reinforce each other in contributing to the development of the widespread disease known as hypertension.

Salt alone has long been recognized as a major factor in triggering high blood pressure, but now Berenson and his colleagues feel their monkey experiments indicate for the first time that sugar has a "synergistic" effect, enhancing the dangers of a high-salt diet.

What concerns him, Berenson said, is that a continuing program he also directs, called the Bogalusa Heart Study, has found that children in that Louisiana town have diets similar to what he is feeding his monkeys.

Berenson's presentation, at a forum sponsored by the American Heart Association, helped show how medical researchers are slowly unraveling the many factors that control high blood pressure and its effects on health.

Hypertension has become the focus of one of the most intense public health education programs of the decade. A sinister disease whose victims may detect no symptoms until serious damage has occurred to the heart and other organs, it has been estimated to afflict from 13 to 28 percent of the adult population, with most of its sufferers unaware they have it.

Treatment often includes recommendations that patients lose weight, take drugs to lower blood pressure, and adopt a low-salt diet.

Berenson took two groups of spider monkeys and put each on a high salt diet, known in both monkeys and man to stimulate high blood pressure. Then he added sucrose sugar to the diet of one group — so much that 36 percent of their calorie intake came from the sugar.

As expected, the blood pressures of both groups of monkeys rose, but in those with the sugar, pressures increased about 25 percent more.

The increase occurred even though both groups of monkeys gained about the same weight. Previous indications of increased hypertension with sugar had been attributed to weight gain alone under such diets, and weight gain itself is a recognized factor in increased blood pressure.

"The amounts of salt and sucrose used in the present study are, although high, within the range of human consumption," Berenson said, adding that the effects of salt and sugar together "may have an important bearing on human hypertension."

Berenson found clear evidence of the similarity of some human diets to the monkey diet in Bogalusa, where in the past several years more than 5000 children have been screened for blood pressure, diet, growth, blood chemistry, and many other factors.

Strikingly, he said, the children in the survey typically received 34 percent of their calories from "snack foods" which are high in both salt and sugar.

So far, however, there is not enough data to show whether blood pressure differences among children are due to dietary differences. For one thing, there are no generally accepted figures for what is normal blood pressure for children.

Other speakers at the conference made clear that hypertension may result from a broad variety of factors, including heredity, diet, body weight, illness, and stress.

One popular idea — that high altitudes help reduce blood pressure — was knocked down a bit by Dr. William Weidman, a professor of pediatrics at the Mayo Medical School in Rochester, Minn.

Three years ago, Weidman conducted a study of 2096 Aymara Indians, who live in villages of northern Chile scattered from plateaus 15,000 feet in altitude down to sea level.

Blood pressure measurements, in line with previous studies of peoples living at extremely high altitudes, showed the Aymara in the highest villages consistently had the lowest blood pressures, measured at various age groups in both men and women.

However, Weidman said, "we took a closer look."

He and his co-workers in the study broke down the statistics so that blood pressure was measured as a function of body weight, and found no difference between the high and low altitude Aymara. It turned out, he said, "that the low altitude Aymara were simply larger."

Moreover, he said, studies of children in the Rochester area showed that pound for pound, they have essentially the same blood pressure as the Aymara. The Aymara, he added, are about the size of an American 12-year-old, with adult men averaging five feet tall and about 100 pounds.

San Francisco Chronicle 5
★ Wed., Jan. 18, 1978

14 San Francisco Chronicle ★★ Wed., Nov. 30, 1977

Feisty Woman And a Landmark Are Honored

By Marshall Kilduff

A troop of civic and political leaders traveled to an old brown house on the crest of San Francisco's Potrero Hill yesterday to honor the peppery woman who presides there.

In the style of these occasions, Enola D. Maxwell, the executive director of the Potrero Hill Neighborhood House, heard herself praised to the skies by Mayor George Moscone, state Senator Milton Marks, Supervisor Bob Gonzales and others.

Then she was handed be-ribboned proclamations commending her for her good work and a handsome certificate designating the 58-year-old "Nabe (Neighborhood) House" as the city's 86th official landmark.

Finally, Maxwell took her turn on the front porch-turned-podium and the politicos stood back. She thanked one and all, and then everyone knew that her new status hadn't changed matters one bit.

"Five years ago I was told that if a black person was elected to this job, somebody would burn this place down," she said.

"I didn't listen. Then we began getting a lot of visits from the fire department and police who were trying to close us down," she said.

Maxwell said she thought many of the area's long-settled white families were uncomfortable with a Neighborhood House changed from a sleepy clubhouse to a social service center with a lot of black visitors.

"Well, we haven't left yet, and we're going to keep on," she added.

The dignitaries, a little unnerved by all the finger-pointing, clapped politely and fidgeted.

But her crowd loved it—the Julian Theater bit players who use the house hall as home base, a dozen retarded kids and adults who had stopped by on their way to a morning class inside and her own following of friends and helpers.

They remembered the time about a year ago when she was handcuffed and booked for disturbing the peace after a cranky neighbor complained about a rock dance she had pulled together for kids from the nearby housing project. The charge eventually was dropped.

They knew how hard she worked at rounding up the money for a seniors meal program and the child care and community groups she invited to use the building.

She thanked them right back. She introduced every friendly face she spotted in the audience, including the Nabe House handyman.

"This place has changed, and we've tried to help people change with it," she said after festivities had concluded.

In 1906 the first large group of Russian immigrants arrived on the hill. By 1919 their numbers had grown so that they needed a new social center with classrooms for English lessons.

Julia Morgan, the architect who designed the Hearst Castle, created the rambling brown-shingle and redwood building on DeHaro street, and it became a centerpiece of the hill's Russian community.

By the 1950s there were more arrivals, this time black. The late 1960's brought turmoil to the governing board of the house, for some wanted to break away from the older traditions to accept a role in treating the social problems connected with public housing on the south side of Potrero Hill.

In 1972 the activist wing of the non-profit, community-run organization won out and Maxwell was chosen director.

The traditional faction felt her selection would invite trouble and bring a whole new crowd to the Nabe House—a prediction that Maxwell has partly justified.

"We're going to have to get the races together someplace and this building is as good as anyplace," she said.

(8) Economic Opportunity

"Opportunity" is a concept that is most noticeably related to the particular/urban area. At this level, we can examine opportunities within neighborhoods, or within the city as a whole. However, there is also the relative standard of national conditions with which to compare and rate findings, and regional comparisons of other cities of similar size and composition, with similar resource bases.

Indicators in this category can include:

- income levels: adherence to minimum wage, guaranteed income, entrance salaries for different vocations, changes over time
- cost of living: high, low, other
- credit opportunity: lack of discrimination
- general economic base: diversity of economic structure, balanced economy, stability of economic structure, percentage of owner-occupied housing
- development opportunity: ratio of small business starts to closures; appropriate technologies; self-maintaining economic, neighborhood systems; industrial capacity; cottage industries
- growth management policies: what are they, by whom, when, how
- tax base: tax levels, acceptable taxes, what is taxed?, distribution of tax dollars
- employment opportunity: availability, quality of employment; opportunities for advancement, job satisfaction levels, how often people change jobs; women and minority groups in labor pool; volunteer work, on-the-job training, continuing education; job counselling and referral services--their availability and use.

State Guide On Solar Tax Credit

San Francisco Chronicle 12/29/77

Sacramento

The state Energy Resources and Conservation Commission yesterday adopted guidelines that specify which solar energy systems qualify for the new state solar tax credit.

The systems meeting the guidelines include direct and indirect space heating and cooling, water and pool heating, pool covers and conservation items installed in conjunction with solar systems.

Legislation enacted this year allows citizens a state income tax credit of $3000 or 55 percent, whichever is less, on the purchase and installation of solar energy systems, retroactive to last January. Businesses receive a 25 percent credit, up to $3000.

The commission also adopted guidelines to require that, after next April 1, certain conservation items be installed at the same time as the solar system to become eligible for the credit.

The guidelines also specify that, after next April 1, all solar systems sold in California must carry a full one-year warranty by the manufacturer and be installed to be eligible for the tax credit.

San Francisco Chronicle ★ Wed., Oct. 26, 1977

Cashing In on Simplicity

Voluntary Simplicity doesn't mean you live in a cave and never go to the store.

Already there is a fast-growing network of small enterprises serving the VS market. In the Bay Area several hundred firms are members of the Briarpatch network, founded six years ago by Richard Raymond of the Whole Earth Catalog and its successor, the Evolution Quarterly.

Briarpatch consists of stores and services that cater to VS needs — simple, inexpensive food and clothing, restaurants, book stores, repair shops, bakeries, child-care centers and other mutual-help enterprises.

SRI International believes that VS will also offer a big potential market for conventional businesses and new enterprises by offering goods that are "functional, healthy, non-polluting, durable, repairable, recyclable or made from renewable resources, energy-cheap, made through simple technology."

Some of the goods are:

- Solid wood furniture.
- Durable cotton and wool clothing that can easily be repaired and worn for years.
- Do-it-yourself tools for building, repairing, gardening.
- Inexpensive prefab housing.
- Small cars and appliances that are easy to repair.
- Natural foods.
- Self-help medical and child-care items.
- Arts and crafts materials.
- High-quality music and TV systems.
- Bicycles and mopeds.
- Simple toys and games, not made from metals or plastics.
- Home canning equipment.
- Kits for making clothes.
- Waste-recycling devices.

And there will be markets for associated services, such as materials recycling, teaching new leisure activities, do-it-yourself games and hobbies, instruction in refurbishing old homes.

Advertising directed at the VS sector will eliminate the razzle-dazzle approach and focus on durability, ease-of-repair and useful information for VS purposes.

ACTIVITY

FACILITATING NOTES

Understanding the basic concepts of this section is important for completing the INTEGRATION. Make certain, therefore, that the group is thoroughly familiar with the Quality of Life indicator categories. It may be helpful for teachers to suggest their own indicator examples to include within these categories, and to find current newspaper articles relating to the indicators. Discussion of these indicators may require considerable time.

OBJECTIVES:	(j)	Understand a general definition of quality of life.
	(k)	Become familiar with some tools which can be used to examine the quality of the urban ecosystem.

READING: Perloff, Harvey, ed. The Quality of the Urban Environment, 1969, Chapter 1, pp. 3-31.

TO DO:

1. Discuss the ways that the quality of life concept is used by the individuals in your group. What do your ideas have in common? Can you develop a group notion of what the quality of life in an urban area means?

2. Perform a general quality of life assessment for the urban place of your choice, either the place you live or one nearby which you know well.

   Rate your individual urban setting for each of quality of life categories on the scale which follows.

   Use any combination of indicators in each category which enable you to rate this category in a general and effective manner.

   Compare your ratings and discuss the reasons for your decisions.

   Are your ratings compatible with the group notion of quality of life as developed in #1 above?

   List some possibilities for improving those categories which you rated as "1".

QUALITY OF LIFE SCALE

3	2	1
High Quality	Intermediate or Tolerable	Low Quality

Quality of Life Categories	Rating
Urban Energy Efficiency	
State of the Natural Environment	
Access to Amenities	
Livability of Climate	
Citizen Influence and Community Control	
Access to Public Services	
Level of Public Health	
Economic Opportunity	

SECTION 6

SECTION 6

RESOURCES

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SECTION 6

CHANGE IN THE CITY: DESIGN AND PLANNING FOR THE URBAN ECOSYSTEM

After completing Section 6, you will:

(l) Understand some general notions of urban design.

(m) Understand two basic patterns of urban growth which can be addressed in design and planning.

We can study the historical development of cities, and we can examine the urban ecosystem as it currently exists. However, unless we have a concept for approaching the decision-making required to change our cities and improve their environmental quality, there is little purpose for the background knowledge about the urban place. The concept of design provides a bridge between our perceptions of what is, the visionary decisions necessary to understand what can and should be, and the planning required to turn these visions into reality. In this section, then, we will examine the design and planning process and its implications on urban form and patterns.

> "It is interesting to contemplate that... a type of growth, proliferation and articulation, characteristic for the nervous system itself, should occur similarly in the most comprehensive product of the human brain, the cultural community and the man-made outer shell--the city."[1]

We have examined the city as an ecosystem, and we have seen that a systems approach to the analysis of urban growth creates a useful framework for making decisions about the urban environment. When this framework is used to make decisions and effect changes it becomes part of the design process. With this process, we can take the knowledge about what is now and how things work and construct or reconstruct an urban system, adapting it to an environment in accord with the goals and objectives of what should be.

DESIGN PROCESS

Design seeks to bring about a better future through a process of disciplined inquiry. The design process explores and devises system states that accomplish goals, and seeks out the paths leading towards them. Design releases creative potential and can involve people in unbound speculation on how to reach the desired outcomes. An urban designer sets forth ideal images of a desired future state, and, while considering constraints, devises ways and means to get as close as possible to optimal urban quality.

It is important to make a distinction between the design of a future urban state, and design for an urban future. The difference is subtle, but vital. Design of a future is concerned with the views

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[1] Neutra, Richard, Survival Through Design, Oxford University Press, 1969.

that shape the new or improved place. Design for a future is concerned with creating the ways and means to satisfy the requirements of that place. It should necessarily follow the ideal image.

To develop a comprehensive design definition that is useful for urban design, we can look at an accepted definition and synthesize this with what we know about the design process. The following is a dictionary definition of "design:"[2]

DESIGN: (di-zin'), N. (Fr. dessien; It. disegno disgnare; L. disignare)

1. a plan; scheme; project
2. → purpose; intention; aim
3. → a thing planned for or outcome aimed at
4. a working out by plan; e.g., do we find a design in history
5. → a plan or sketch to work from; pattern
6. the art of making designs or patterns
7. → the arrangements of parts, details, form, color, etc., especially so as to produce a complete and artictic unit; artistic invention
8. → a finished artistic work
9. all of the above

Using those parts of this definition that are indicated above, and understanding the notions about design presented previously, we can make a general definition of the urban design process. The major parts of this process are:

URBAN DESIGN PROCESS

- Formulation of the goals or requirements of the urban system to be designed, or the specification of the urban future we wish to attain;
- The devising of a set of differentiated alternatives, alternatives that are acceptable representations of the urban future;
- The display of criteria by which to examine the alternatives;
- Selection of the most promising alternative(s); and
- The communication of findings.

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[2]Adapted from Webster's New World Dictionary of the American Language College Edition; World Publishing Co., Cleveland and New York, 1964.

These process parts do not constitute a step-by-step procedure, but are interactive. The urban designer considers the effect of the ongoing design process on what he has already done, as well as on those aims yet to be reached.

In summary, the influence of the design process and design decisions on the environment is both complex and highly integral to the creation of urban form. An urban design in its most comprehensive sense, can be evaluated by its effect on the relationships between natural and human systems, and on the interaction between the subsystems of the city. Through planning and coordination of design elements, people create and maintain urban patterns. Through interaction with each other, and with the urban patterns this interaction creates, people build a perceptual base for further interaction--a system of values, attitudes and behavior associated with the city. Our problem is how to develop a viable, environmentally high-quality urban design from which we can plan services for satisfying human needs in the city.

a. The Notion of Landscape

> "Design undertaken without knowledge of psychological and perceptual processes, of the relationships of organized space and group dynamics, of the different needs of sex and age groups, of the developmental and behavioral necessity of play, nonhuman organisms, the seasonal cycle, and weather, cannot hope to improve conditions."[3]

To determine the effect of humans on the city and of the city on humans and to make design decisions, it is necessary to consider some underlying values. Many of these values center around the concept of landscape.

LANDSCAPE

The landscape is an area in which both physical and cultural relationships are distinct. The landscape can be thought of not only as an actual scene, viewed by a particular observer, but as a generalization arising from the observation of many individual scenes. As such, the definition of the landscape depends on the frame of reference of the observer. Therefore, when attempting to design a landscape or evaluate a proposed plan for one, it is necessary to examine perceptions of the participants and the resulting image of the cityscape.

RELATIVE STANDARDS

These will yield relative standards of value, which are qualitative, depending on an individual's or group's perspective. These standards require consideration of the scale and dimension of the problem--the particulars

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[3] Milgram, Stanley, "The Experience of Living in Cities," in ENVIRON/MENTAL, Paul Shepard and Daniel McKinley, eds., Boston: Houghton Mifflin Co., 1971, pp. 183-202.

place and time involved in the design and the implications of the design decision.

NORMATIVE STANDARDS

Normative standards of value, on the other hand, are quantitative. They require statistics for design and decision-making and result in regulations, such as building standards and zoning boundaries.

Different cultures use different design strategies based on their perceptions of the landscape. For example, for several thousand years the Chinese have practiced the art of placing and designing their cities, residences and tombs to harmonize with the local currents of "energies" flowing through their surroundings.[4] Feng-shui is the term for this practice, meaning literally "wind and water."

FENG-SHUI

The practice is not only concerned with topographical and ecological considerations, it is closely tied to mythology and the belief that at every place there are special topographical features, either natural or artificial, that modify the energies present. They place equal importance on the forms and arrangements of hills and the influence of sun, moon and planets on the building site. Using these principles to locate cities leads to the selection of functionally and ecologically sound sites. But most important, the practice of feng-shui reaffirms in the minds of the inhabitants their place in the larger order of things.

Similarly, some designers and planners in the West have a perspective of building that deliberately uses the

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[4]Bender, Environmental Design Primer, p. 180.

"genus loci," the inherent qualities of a site.[5] They make use of this concept by recognizing in their designs that some lands are more suitable for urbanization than others. Lands that are most productive for man when used for agricultural purposes (or left undeveloped) will not be those best suited for urbanization. All too often, however, development pressures force land into a use other than what is most suitable or energy-efficient.

GENUS LOCI

Another effect of the "genus loci" concept in practice is to help the designer to remember that the city is an ecosystem, and that its character derives from its site. The buildings and spaces within the city add to this character, not only by supplying new resources, but also by creating a new landscape that can enhance environmental quality and the urban quality of life. It is upon this base that design decisions are made and policy is formulated.

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[5] McHarg, Ian, Design with Nature, New York: Doubleday & Co., Inc., 1971, p. 175.

b. Developing the Future: Some Scenarios for Urban Design

Before we introduce the ways in which we, as urban dwellers, can effect changes on the cityscape, it is useful to get the feel of how some urban designers visualize the ideal city. People usually extrapolate from their own experience when making predictions, and often expect little besides size or scale to change. Thus, the common vision of the city of the future is that of a sprawling megalopolis--with slicker architecture and more modern transport systems, but with life support systems, resource use, and social patterns not much different from those of today's metropolis.

ARCOLOGY

However, some people have different visions. Paolo Soleri looks toward "arcologies," three dimensional megastructures, which, by virtue of their high population density, will permit large areas of land to remain as open space, as the cities build up rather than out.[6] This sort of development will have resource-conserving and aesthetic advantages; yet many people look at his designs and think "beehive," and so are reluctant to accept the megastructures as possibilities.

Peter Goldmark, of Goldmark Communications, recommends a completely different direction for urban

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[6]Soleri, Paolo, Arcology: The City in the Image of Man, Boston: M.I.T. Press, 1969.

development.[7] Starting from a concept of the city that stresses its economic function, Goldmark speculates that such functions could be fulfilled as well, if not better, by a dispersed population connected via a sophisticated telecommunications system. According to Goldmark, home computer terminals, linked by cable TV to a vast array of data banks, switching stations, and other homes, would greatly alter social patterns. People would choose to live in suburban or semi-rural settings and work from home without needing to commute to a central city office. Shopping, and even education, could be carried out from the home terminal. Proponents of this strategy anticipate major energy savings by reducing "unnecessary travel" to a minimum. Goldmark's critics point out the probable loss of face-to-face contact in such an environment, and the hard-to-measure values of human interaction, which seem to play a minor role in Goldmark's electronic village.

Other thinkers feel that cities like those we have today will continue to exist but with major changes in their internal physical, political and economic structures and their relationships to their resource base. Pointing to the extreme dependence of cities on a fragile external resource base and the expenses of urban growth in both economic and social terms (such as, the rising cost of services and the reduced accountability of public agencies),

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[7] Goldmark, Peter C. "Can Electronics Revise Rural Society? And Save the Cities, Too?" Senior Scholastic 106: pp. 14-16, March 27, 1975.

they propose a new vision of the role of the city, and the relations among its parts that places more emphasis on local control of energy resources.[8]

[8] Morris, David and Hess, Karl, Neighborhood Power, Boston: Beacon Press, 1975.

c. Planning for Urban Growth

In previous sections we have seen some relationship develop between the physical patterns of a city and its energy-based driving functions. We have also examined some ways in which people perceive themselves in the urban ecosystem and how their perceptions affect the ways in which they interact with each other and with the city. All of these relationships, in turn, affect the process of how we evaluate and design urban futures which allow for growth.

PLANNING PROCESS

In this context, it will be useful to look at the planning process as an activity centrally concerned with the linkage between design knowledge and organized action. It is located precisely between design knowledge and coordination of activity for change. By the design of decision and policy-making systems, we can investigate and help create or destroy the urban patterns that emerge from these interactions. These decisions will involve values and goals about an ideal urban place, and also involve the processes that must occur to achieve these goals and values. These processes create the ways and means of change. They constitute planning. Design and planning are interactive, and actually occur simultaneously. However, for purposes of definition, we can outline part of the design-planning cycle.

ANTICIPATORY PLANNING

A system of anticipatory planning is essential for increasing the power and authority of public participation in policy formation. With this process, using a systemic approach for planning, we have the ability to predict--not necessarily the exact results of decisions, but their implications and the consequences of success. In other words, we can see which components and networks in a city will be affected by any particular decision.

New or expanded human settlements are required for our increasing population, yet there is continued disagreement over how urban growth should proceed in order to accommodate population pressure with minimal stress on either natural systems or quality of life. We will discuss the diverse problems of planning for urban growth by focusing on two approaches to solving them: internal urban development and external urban expansion.

Internal Urban Development:

Internal changes in the cities occur when vacant land is settled, and neighborhoods develop, stabilize, and decay into slums. The usual way to attack this type of urban problem has been by mounting "urban renewal" projects. But how? And for what? Proposals range from national urban policy programs to local supervision and neighborhood action.

Development in cities is often followed by decay. As internal development uses up available land (or at least makes it unusable for expected future development), growth declines, economic stagnation sets in, and a variety of self-accelerating decay processes are encouraged. Housing deteriorates, more prosperous residents flee to the suburbs, and tax revenues suffer, leaving the city as a whole economically ill-equipped to deal with pressures for increased services and re-development efforts.

Recently, much "official" attention has been turned to the possibility of internal urban growth, as witnessed by the flurry of "sweat equity" housing programs and HUD's "New towns in town" program.[9] Such approaches may be a response to recognizing the "costs of sprawl" such as the diversion of agricultural land to urban development, the service diseconomics of an extensive urban mass and the diffusion of community focus (once a key feature of urban life) resulting from many contemporary urban sprawl development patterns. It also may be a response to a pragmatic commitment of people to work where they are, often because they lack the resources to relocate.

Urban renewal efforts attempting to deal with urban deterioration have left mixed results. Some successes have been qualified by a development theory stressing economics over social factors. Existing neighborhoods have been eliminated in favor of attracting new businesses or residents that would "increase the tax base," a reasonable goal, but one that took little account of the needs of displaced residents, their options to move elsewhere, or the stresses caused elsewhere in the system by absorbing them.

Internal urban growth can proceed in a variety of ways, and it is important that the concepts be assessed and understood before they are locked into place as part of the physical urban structure.

Present decisions will constrain future options, just as past choices have restricted our options today. For example, the growth of the city around the private automobile makes it difficult to get around in many

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[9] "Sweat equity" programs are community projects that support the rehabilitation of existing structures by cooperative groups who gain ownership through their invested labor in lieu of money. "New towns" are "total design" communities. Previously, they were generally planned as external clusters. However the "new towns in town" program emphasizes total design for urban communities inside the central city.

cities without one. Using air conditioners to cool buildings actually warms the air outside them, making it still more uncomfortable to be without an air conditioner.

The vitality of the concentrated urban center is undermined by peripheral suburban development. The suburbs benefit from the infrastructure already in place in the city, extract revenues from it and overload its services.[10]

DENSIFICATION

From an energy perspective, the most important advantage of internally focused urban growth is its potential for resource conservation. "Densification," especially when coupled with mixed zoning that ends the separation of residential and business neighborhoods, can result in a greatly reduced need to travel. Dense or clustered structures may have less heat loss than the separated, sprawling structures common in less dense settings.[11] As with many other energy saving strategies, this has the additional advantage of creating jobs in the local community undergoing redevelopment.

Internal urban growth uses development processes different from those that create new communities outside the city. Because residents are often already in place, they can be involved in the redevelopment process rather than displaced to permit development. While municipal and federal bureaucracies have often been slow to move creatively on urban problems, grass root redevelopment projects have captured the imaginations of communities around the country. Pushed by the needs of local residents, and constrained by their limited resources, these projects have been forced to develop innovative solutions to urban blight. One example is the "sweat equity" rehabilitation projects mentioned earlier. This renovation of old structures provides housing for people while teaching marketable skills in the process. Some of these projects have been leaders in exploring urban applications of renewable energy sources and other "appropriate technologies."

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[10] Whyte, William H., The Last Landscape. New York: Doubleday & Co., Inc., 1970, Chapter 20.

[11] Density, Whyte is quick to point out, is not synonymous with crowding. It is a subjective factor, and one that wise planning can accommodate. He points out, for example, that the high rise housing project, everybody's bad dream of urban crowding, "generally houses less people per acre than the neighborhood that was torn down to make way for it." Ibid, p. 381.

APPROPRIATE TECHNOLOGIES

Appropriate technologies present both new options and new constraints for internal urban growth. They offer the technical feasibility of ecologically integrated neighborhoods--communities which go beyond simple solar heating of individual structures to: (1) take advantage of economies of scale which may often appear at the block or neighborhood level, and (2) interconnect life support systems which are usually separated to reproduce, in a limited way, the interconnections for natural ecosystems. For example, on-site waste treatment can yield energy for local use as well as nutrients for urban agriculture projects. Solar heated greenhouses can provide year round vegetable production as well as space heat. Planting trees and creating small parks contributes to cooling and shade in summer.

Reliance on such technologies, of course, would place a limit on the population that could be supported in this "densification" process. For example, a community relying on solar energy resources would find that the solar energy variations would be a key factor in determining that community's carrying capacity,* even with its renewable energy resource economy. On the other hand, water consumption and pollution generation could be greatly reduced.

Limits exist to other forms of development as well, though they may not be as obvious as those in the example above. It has been estimated that some five acres of land are required to support each urban resident.[12] This includes the land for the city, agricultural land, highways, and the land that processes sewage and other wastes. Thus, apparently beneficial increases in urban density may be purchased at the expense of deterioration of environmental quality elsewhere in the region.

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*Carrying capacity is determined by the ability of the resources of a community or region to support a given population over the long term without suffering deterioration.

[12] Eugene P. Odum, "Optimum Population and Environment: A Georgian Microcosm," in Man's Natural Environment: A Systems Approach. Lorne Russwurm and Edward Sommerville, ed., North Scituate, Mass.: Duxbury Press, 1974, p. 324.

Sensible use of appropriate technology could minimize such problems, but like any technical solution they can only begin to manage sensible urban development. Many other factors must also be part of an overall strategy. Some of these are: (1) ownership structures that encourage participation and commitment by urban residents; (2) credit structures that can finance redevelopment while reducing the economic drain that weakens inner cities; and (3) planning structures that foster citizen involvement and that provide equitable procedures for balancing conflicting needs of different groups, for example, residential versus business, and the conflicting needs of individuals for housing and open space.

External Urban Growth:

External urban growth occurs when the city expands its boundaries and transportation arteries: suburbs, and shopping centers replace farm or undeveloped lands. Planned expansion, whether in response to the voluntary exodus from the city of the affluent or the less willing migration of displaced lower income groups, is a popular design option for dealing with expected population pressures. While this has traditionally taken the form of minimally planned urban sprawl in which expanding suburban and urban development create vast, disorganized metropolitan areas, deliberate approaches have evolved to manage external urban growth. New towns, greenbelts and regional corridors have been carefully planned and legally constrained to remain so. Yet they are expected to overcome the problems usually associated with large urban developments while providing the mixed benefits of urban culture in the midst of a more "natural" environment.

One consideration that must be confronted by planners is the encroachment of the city on peripheral agricultural lands. However, some planners and policy-makers raise counter-questions regarding the adaptability of urban and exurban lands to their most suitable and efficient use.[13] Are cities in fact more efficient users of land than farms? Does metropolitan growth in fact free more land for agricultural use? Historical and contemporary designs for urban expansion offer multi-faceted proposals and solutions for dealing with an increasing urban population.

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[13] Clawson, Marion, "Urban Land Use," in Metropolis, C.E. Elias, Jr., et al, Belmont, CA: Wadsworth, Publishing Co., Inc., 1964, P. 143.

The importance of human/nature interactions has been a key organizing concept for public and private action in American urbanization since the Industrial Revolution. Principles such as those suggested for the Garden Cities designs of the 1890's (planned just outside of London, England) are still important. These principles included: (1) limited size with new population accommodated in new cities; (2) reservation of natural land around each city for permanent access by city residents; and (3) quasi-public ownership to secure for the public the profits resulting from urbanization.

Zoning was introduced in the early twentieth century as a means of separating and identifying the uses of sections in the city. Most American cities (Houston is the only major exception) have zoning and thus reflect the traditional division into industrial, commercial, and residential areas with various population densities, characteristics, and growth concerns.

In the early years of the century popular movements for better housing and other social reforms drew public attention to urban problems and made it clear that organization of physical structure was not sufficient for good design. Social and economic forces were increasingly recognized as important determinants of urban quality as evidenced in a series of U.S. Housing Acts, the major expression on a national scale of public concern about the quality of life in cities.

The Housing Acts of the 1960's reflect a growing awareness of the complexity of the urban system. In the early 60's several large cities attempted to create computer models for their urban systems. Most of these were done by Community Renewal Programs under the Housing Act of 1959. The Model Cities Program, in the Housing Act of 1966, required cities to examine the social, economic and cultural factors affecting conditions in urban areas. The physical development of cities was then seen as an expression of a complex system of economic and social factors.

Awareness of regional growth patterns has increased dramatically in the past twenty years, partly because of interest in environment energy connections and conservationist ethics. Regional changes in urban growth patterns included the migration to the suburbs by middle-class families which began in the 1920's and accelerated during the years after World War II. In the latter part of the 40's, almost three-fifths of

new housing was built in the suburbs.[14] The movement of families was followed by a movement of manufacture, retail shipping, and regional headquarters of businesses to the suburban areas.

The simplistic picture of declining cities and sprawling suburbs is giving way to a more complex understanding of the interrelated urban system. Many planners and urban observers believe that a multi-modal, decentralized pattern such as that of Los Angeles will be the eventual result of present trends. At the same time, however, some important functions are centralizing at an unprecedented rate. Brian Berry, for example, points out that an exodus of manufacturing jobs and retail sales from central city areas is balanced by changes of a contrary kind--such as an increase in investment in office construction, immigration of new workers, or even new investment in manufacturing.[15] In other words, statistics for total change are often misleading because they do not show the dynamics of the multicore, multi-connection system which is the urban area.

ISSUES TO CONSIDER

Some of the most important issues related to developing urban patterns are: What is the constitutionality of public action to control or influence urban form? What are the consequences of decentralization for energy use? What are permissable levels of damage to the environment by residential, industrial, and commercial development? How important is equal access by persons of different socioeconomic groups to particular regions, such as the California Coastal Zone?

Ideas which are currently being explored concerning regional urban growth patterns include the following: (1) fair-share housing with allocation of a percentage of low-cost housing going to different areas within the region; (2) growth control related to the number of new housing units constructed, or to the availability of water and other resources; (3) greenbelt or open space reservation, including reservation for agriculture inside and outside the city; (4) cooperative or communal residential settings.

The growing awareness of environmental connections in relation to urban growth has been expressed in a number of pieces of legislation on the federal

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[14] Scott, Mel. American City Planning Since 1890. Berkeley: University of California Press, 1971, p. 452.

[15] Berry, Brian J. L. and Kasarda, John D. Contemporary Urban Ecology, New York: MacMillan Publishing Co., Inc., 1972, pp. 263-267.

and state levels. The Environmental Protection Act and California's State-mandated General Plan have specific elements which deal with environmental quality. There are also numerous regional and city plans with energy-efficient growth components: the Columbia Regional Area of Governments (CRAG) in the Pacific Northwest, with its emphasis on the relationship of energy to urban expansion, such as how much energy any new additions may require; the new comprehensive plan for the State of Florida with its concept of energy analysis; and the Environmental Management Plan of the Association of Bay Area Governments (ABAG), in the San Francisco Bay Area with its focus on energy conservation and the impact on water quality, air quality, and solid waste treatment.

Following are several short articles exemplifying various urban planning issues. These types of issues show us people's differences in opinions as to what are important considerations for the quality of life in their urban place, and what kinds of design and planning processes are required to attain their optimal urban state. As you read these examples, keep in mind the importance of <u>anticipatory</u> planning and the necessity of examining the implications and consequences of planning decisions. Also, keep in mind the importance of informed public participation in urban planning and policy formation.

EXAMPLES OF SOME
COMPREHENSIVE URBAN ISSUES . . .

City wants land donated for street

EUGENE
REGISTER/GUARD
EUGENE, OREGON
11/18/77

OAKRIDGE — It may not be fair, city officials admit, but they'd still like about 20 property owners in the Willamette City section of Oakridge to donate land to the city for a street improvement.

What isn't fair, city officials agree, is that property owners on one side of School Street and River Road won't be asked to donate any property while those on the other are being asked for a 10-foot-deep strip across the front of their lots.

It has to be that way, city officials say, because there isn't enough vacant land the front of properties on the north side of School Street or the east side of River Road to carve off a 10-foot strip.

If the city is able to convince property owners to make the donations, however, it will mean an improvement of some 3,500 feet of School Street and River Road without expense to the city or its residents.

Lane County has agreed to make the improvements in exchange for the city's agreement to assume ownership and responsibility for maintenance of the former county road.

City Administrator Dave Waffle announced the county's agreement and outlined the attendant right-of-way problem at Thursday night's city council meeting.

The county would repave the street to a width of 36 feet and construct six-foot-wide sidewalks on each side — if the city is able to provide a 50-foot (instead of the present 40-foot) right of way. The project also will afford opportunity to straighten out the east end of School Street where it meets Rainbow Road.

"It'll be completely dollar-free," said an exuberant Mayor Ron Paddock. "I don't think we'll ever have this opportunity again."

Waffle will start contacting property owers, including the Oakridge School District, next Monday night. The school board will be asked to donate part of the Willamette City School property, which the district is selling.

If property owners don't agree to donate right of way, the city has the option of condemning property, of course, but that means paying the fair market value.

However, as one councilman in the financially pinched city said Thursday night, "Let's not even talk about that now."

Building Boom Downtown

By Lloyd Watson

There really hasn't been anything like it since San Francisco rebuilt itself after the earthquake and fire of 1906.

The city's postwar and late '60s building booms were bush league compared to what's happening downtown today.

On the drawing boards, or already under way, are a score of high and low structures that will add seven million square feet of office space — the equivalent of six Bank of America World Headquarters buildings — to the downtown area over the next two to three years.

At an average cost of $50 a square foot, that works out to $350 million, far and away the biggest construction bill in San Francisco history.

And that's just office space, downtown.

When you include the Yerba Buena Center sports, convention and exhibition halls; a number of major hospital and industrial expansions, and the Three R's — those retail-residential-recreational conglomerations that keep popping up over town — it's evident why there are smiling faces among the city's building trades.

Lines of would-be tenants for the

Back Page Col. 1

new space are already forming because the vacancy factor for office buildings here is the lowest of any major city in the nation.

That's the word from Elmer G. Johnson, executive vice president of the Building Owners and Managers Association of San Francisco, an organization that keeps tab on the space available in 220 commercial buildings around the city.

At last count, in October, the vacancy factor here was 8.9 percent citywide, about 5.5 percent downtown.

"Although we don't have the current figures, I'd wager it's double that in New York, Los Angeles or Chicago, and probably triple that in many other cities," Johnson said.

"I'm told by leasing agents that if someone wanted a big hunk of space here, say 100,000 square feet on adjacent floors, they'd be very hard put to find it."

And it's going to get worse before it gets better.

None of the buildings now under construction will be ready before 1979. By then, the No Vacancy signs should be up all over town.

Johnson expects that the towering, lozenge-shaped 595 Market Building, the first of the new high rises scheduled for completion, will be filled within a year of its 1979 opening, a far cry from the normal course of real estate leasing.

William H. Cole, vice president in charge of Coldwell Banker's commercial brokerage operations and the man who probably oversees more San Francisco space allocations than anyone in town, thinks the market will remain tight until 1980, when six major new projects are scheduled for completion.

"There is still a little space shotgunned around the financial district," he concedes, "but it is in small pieces."

Since 1965, Cole points out, 34 major office towers have gone up here, contributing 16 million rentable square feet, or almost 40 percent of all the office space now available in San Francisco.

That averages out to about 1.3 million square feet of new space a year, which, fortunately, is just about what annual demand has been.

"Last year's new construction, however, didn't help matters much," Cole said. "Four new buildings totaling 1.3 million square feet came on stream, but practically all the space was taken up by the owners."

This year, there will be no major completions, and next year only two.

The result, said Cole, has been a new emphasis on "pre-leasing" — signing contracts for space that hasn't been built.

"Major corporations wanting to expand their operations here are now pre-leasing large blocks of space in buildings that are still in the planning stage," Cole said.

Cole likes to break down the raft of new building proposals into "most likely," "probable" and "iffy."

Eleven buildings are in his "most likely" category. They will, when realized over the next three years, provide 5¼ million square feet — well over two million of which, he claims, will be spoken for long before the ground-breaking, let alone ribbon-cutting' ceremonies.

Meantime, says Peter A. Clarke of Clarke & Cramer, we're in a "seller's market."

Clarke is typical of the city's smaller real estate operators who must hustle a bit harder than the big ones for their commissions.

He's not at all dismayed by the prospects of a two-year status quo in leasing space, but sees it as "a challenge, an opportunity."

"I think it's going to be fun," he said.

"There's next to no new space available now — the last two big buildings to go up, One Market Plaza and the First California Bank building, are both over 90 percent leased — and there's nothing much on the horizon. But people will still be shifting around, moving to larger quarters.

"As a small shop, we're used to constantly checking things out. We have to stay on top of things. So we've got a pretty good idea where the game will be played between now and 1980."

The chief playground, of course, will be the city's older Class A buildings, which are climbing in occupancy and rental rates hand-in-hand with the new highrises.

But two or three years from now? Who knows?

Here's a rundown of what downtown can look forward to, the Federal Reserve and the San Francisco Planning Commission willing:

Scheduled for completion in 1979:

• 595 Market, a 31-story, $40 million edifice now rising at Market and Second streets. Developer is Marathon Corp., a subsidiary of Canadian Pacific.

• 180 Howard street, at Main, a 13-story project of San Mateo's Borel Development Corp., getting under way this month.

For completion in 1980:

• 333 Market, between Fremont and Beale streets, a 32-story $40 million tower, jointly owned by Metropolitan Life, Bechtel Corp. and San Francisco realty tycoon Walter Shorenstein.

• 444 Market, between Front and Battery, a 36-story venture of Canadian developers, Daon Corp. and Cadillac Fairview Co. One of the prime tenants is said to be Shaklee Corp., which will be moving its headquarters from Emeryville.

• 180 Montgomery street, at Bush, a 25-story tower that will replace the former E. F. Hutton headquarters. San Francisco architect Corwin Booth is in charge.

• Redwood Tower, Sansome and Clay streets, 19 stories, developed by C. Patrick Mahoney & Co., San Francisco.

• 201 California, at Front, a 17-story project of Peck & Tooley, Los Angeles.

• 601 Montgomery at Clay, a 19-story development that has given the heave-ho to one of San Francisco's hallowed jazz joints, Earthquake McGoon's. Cahill Bros. and Houston's Trammell Crow are the developers.

For completion in 1981:

• 101 California, a block-square (Davis, Pine and Front), 47-story monster, courtesy of Gerald D. Hines Co., also of Houston.

• Levi Square, Battery and Union streets, Levi Strauss & Co.'s four-block office park at the foot of Telegraph Hill.

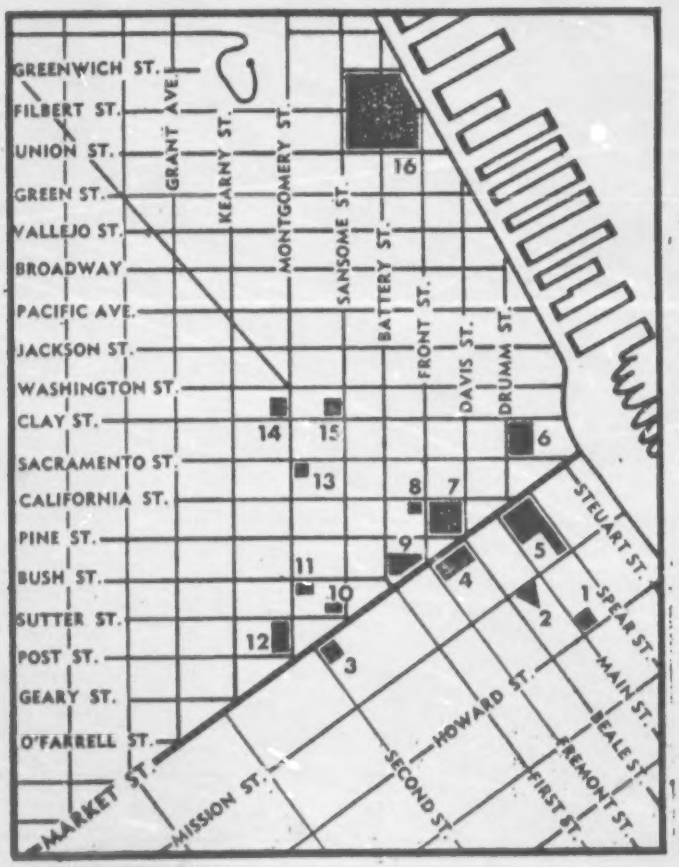
• Embarcadero Center No. Four, final unit of the Portman-Rockefeller colossus.

Further on down the line, we can expect the Federal Reserve Bank's blockbuster at Market and Main streets; a 33-story Southern Pacific Gateway tower set between the freeway ramps on lower Mission; a high rise replacement for the classic little Sutro & Co. headquarters at Montgomery and Sacramento, George Yerby's $50 million Candlestick Cove executive park, and a new world headquarters for Crocker Bank at Montgomery and Market.

Another high rise office tower — expected to reach 35 stories — is planned for No. 1 Sansome street, at Sutter, on property now occupied by the old home office of the Anglo California Bank, now part of Crocker Bank.

Developers of the project are San Francisco's J. Patrick Mahoney & Co. and Citibank of New York. No construction date is definitely scheduled yet.

Then, of course, one day the city is supposed to get new Neiman-Marcus and Saks department stores on Union Square, and something called the Yerba Buena Center. But that's another story.



The key to map of new downtown buildings: 1—180 Howard street; 2—Southern Pacific Gateway Tower; 3—595 Market street; 4—333 Market street; 5—Federal Reserve Bank; 6—Embarcadero Center No. 4; 7—101 California street; 8—201 California street; 9—444 Market street; 10—1 Sansome street; 11—180 Montgomery street; 12—Crocker Bank World Headquarters; 13—Montgomery & Sacramento streets; 14—601 Montgomery street; 15—Redwood Tower, 505 Sansome street, and 16—Levi Square

Sonoma's Greenbelt Plan

By [illegible] World, Sunday, Dec. 11, 1977

THE SCENARIO was all set for Sonoma county to become another congested, besmogged Santa Clara county and for its largest city, Santa Rosa, to turn into another San Jose, but something happened on the gung-ho way to metropolis.

This Land

Napa county to the east and Marin to the south had long since protected their vineyards and rolling hills with agricultural zoning. Sonoma had done little to halt runaway urbanization except for Petaluma, which successfully carried its controlled growth plan all the way to the U.S. Supreme Court.

But it now looks as if Sonoma may well become something else — the first Bay Area county, perhaps the first in the nation, to create a permanent agricultural greenbelt at the urban fringe by use of waste water to irrigate farmland.

Santa Clara county's original agricultural greenbelt zoning, designed to save the orchards, crumbled long ago under the pressure of urbanization and irresistible profits from land sales. Greenbelt zoning in Napa could be in similar trouble if the wine industry should become overextended and the profits of the vineyards were to drop off, tempting growers to sell to the subdividers. Agricultural zoning in Marin could be in jeopardy if the dairy farmers, who hold most of the open space, continue to suffer from the economic squeeze.

A greenbelt needs a solid economic basis. There has to be money in it and some ingenious residents of Sonoma county believe they have found precisely that justification — dollar benefits for almost everybody.

Dr. William Kortum, a Petaluma veterinarian and former supervisor, is a chief proponent of a greenbelt plan that could set a pattern for urbanizing areas in many parts of the nation.

* * *

KORTUM comes from a family that has fought the bulldozers since the late 1940's when his father, Max, and older brother Karl (longtime director of San Francisco's Maritime Museum) led Petaluma's successful fight against a freeway that would have ruined valuable farmlands.

In 1958 Bill Kortum, inspired as unnumerable others have been by the Bay Area's number-one environmentalist, Dorothy Erskine, joined Mrs. Erskine in organizing People for Open Space, whose goal is a contiguous regional greenbelt through the nine Bay Area counties. Kortum's own baptism in anti-bulldozer politics came when he campaigned for the Petaluma Design Plan — the eminently sensible proposal to control urban sprawl by absorbing growth first into the existing urban community instead of leapfrogging out into the countryside, where the taxpayers would have to provide millions for new streets, schools, fire and police protection and utilities.

The Petaluma proposal was for a "rolling greenbelt." Open-space zoning around the community would confine growth to the urban area until the community was full, then the greenbelt would be moved steadily outward to accommodate controlled growth.

"The supervisors wouldn't go along with the plan," Kortum says, "because they felt it would not be fair to the landowners whose property would be put into a holding pattern indefinitely while they were paying taxes on it. So we came up with the idea of a permanent greenbelt on land that would be publicly owned. The problem was finding the money to buy the land."

Kortum learned that under the federal Clean Water Act Sonoma communities were going to have to spend some $100 million or more to clean up the sewage that they were dumping into the Russian and Petaluma rivers and other waterways.

"My first thought was that it would be nice if we could get 10 per cent of that amount to buy greenbelt land. Then I remembered hearing about places where urban wastewater is used for irrigation — Golden Gate Park, for example, and Oakmont, the retirement community east of Santa Rosa, which uses its treated wastewater to irrigate lawns and a golf course."

* * *

AT THE same time Donald Head, county director of Public Works, was working on ways to handle the sewage problem. To continue to dump the waste into rivers and streams would be impossible; the federal government has decreed that by 1985 there will be no waste water permitted to flow into streams unless it has been given tertiary treatment, converting it almost to drinking water standards prohibitively expensive in Sonoma.

But wastewater with less expensive secondary treatment could be disposed on land. The idea was a natural for Sonoma. The county's number-one industry is dairying. But it is an ailing industry, primarily because the land does not produce enough feed for the county's 50,000 cows the year around, and during the lean months feed has to be hauled in from the Central Valley.

The valley's fodder crops are being replaced by grapes, cotton, safflower and other high-paying crops that can be sold for export. With rising transportation costs, the cost of buying feed is closing the noose on dairymen in both Sonoma and Marin. For many of them the only way out might be to sell to subdividers. So it seemed reasonable to use secondary-treated wastewater to irrigate Sonoma lands that could raise inexpensive feed for Sonoma and Marin cows.

Kortum and some colleagues(including representatives of the Farm Bureau, decided in 1973 to try out the scheme on a pilot project. They had cooperation from all sides. The city of Rohnert Park donated an eight-acre plot next to its sewage plant; the county put up $3000; PG&E contributed some power lines.

The experiment worked. In addition to a normal oat-hay crop, the wastewater made possible the cultivation of a second crop on the same land — feed →

corn, for use as silage. (For corn silage, the entire plant, not merely the grain, is used for fodder.)

The following year, inspired by Kortum's success, the city of Santa Rosa put up $150,000 to finance a much larger experiment, which was also successful.

* * *

USING such a system on a county-wide basis would accomplish three purposes: the communities would dispose of their wastewater; the dairy farmers would be provided with cheaper fodder, helping them stay in business; and the land used for the purpose would become a permanent greenbelt, controlling urban sprawl.

Dorothy Erskine, who was organizing a People for Open Space conference on the county's future, came up with a name: the Triple Use Plan. As designed by engineer Donald Head the plan seemed to make economic sense from every standpoint. Wastewater from the new Llano sewage plant, jointly built by Santa Rosa, Sebastopol, Rohnert Park and Cotati, would be piped 17 miles south to Tolay lake, a natural ponding area that had been drained years ago. Petaluma, which is closer, would pipe its wastewater directly into the lake.

"Urban wastewater," Kortum explains, "is rich in phosphorus and nitrates, which pollute rivers and lakes but fertilize farmland. So irrigation water could be drawn directly from the pipeline. During the winter, when irrigation water is not needed, it would be stored in Tolay lake for summer use."

The entire wastewater system would be 75 per cent federally financed, with state and local governments splitting the remainder. Some 12,000 acres will be needed to handle the wastewaters by 1988; and 19,000 acres by 1998. Using sewer fees and other funds for its share of the costs, the county can purchase lands as they come onto the market and lease them to growers, or could purchase open-space easements and use other means of reserving the land for public purposes.

The Triple Use Plan is still a plan and requires approval by the usual battery of federal, state and local agencies. If they approve, and the plan is carried out, Sonoma will have pioneered in a method that may be the only feasible way to save what Dorothy Erskine calls "working greenbelts." The way to save open space is to make it pay off.

Harold Gilliam writes on futures research each Wednesday in The Chronicle.

S.F. Chronicle 10/31/77

Fear of Sprawl Along a New Road

Sacramento

Governor Brown's Office of Planning and Research fears a new highway south of San Jose could become a prime example of urban sprawl.

Brown's Department of Transportation intends to replace the 12-mile stretch of Highway 101 between San Jose and Morgan Hill, known as "blood alley" for its high rate of fatal auto accidents.

But Bill Press and Mike Fischer of the Office of Planning and Research recently warned that the new highway would create "extreme growth pressure" in the agricultural Coyote valley along its route.

Applying the anti-sprawl principles of their new Urban Development Strategy, Press and Fischer warned: "Coyote valley would likely be filled with single-family homes and Monterey highway (the existing Highway 101) would probably develop into another El Camino Real," a reference to the San Francisco Peninsula highway, which is lined with shopping centers and used car lots.

Apparently accepting as inevitable Brown's plan to build a new highway a short distance from the old one, the Office of Planning and Research concentrated on methods to discourage sprawl along the old highway route.

Fischer said the proposal is designed to make the old Highway 101 into "a discontinuous country road," either by dividing it into a series of cul-de-sacs or by reducing it from six lanes to a meandering four lanes.

A spokesman for state highway director Adriana Gianturco said a decision on what to do with the old road is still a few years away. But the spokesman introduced a note of skepticism to the proposals by Press and Fischer by noting changes in the old highway would cost a good deal of precious highway funds.

— Larry Liebert

* Annexation isn't Westfir's answer

WESTFIR — Residents of Westfir apparently can't yet count on annexation to Oakridge as an alternative in their search for a permanent arrangement for financing fire protection and water and sewage services.

The Oakridge City Council indicated Thursday night it is willing to talk with representatives of the Westfir Residents Assn. about annexation.

City Administrator Dave Waffle said the inquiry had been made by several members of the organization's water and sewer committee. He said fire protection and water service to the Westfir area would be "fairly easy" and that sewage disposal possibly could be under a septic tank management program.

City Council members said they'd like to meet with Westfir representatives first to determine what they services they would expect.

Larry Phipps, Westfir association president, said the group has to find out because the it has been told by the Lane County Boundary Commission staff that annexation should be its initial recourse, then incorporation as a separate city, then creation of a special service district.

The preference of Westfir residents appears to be in the opposite order, Phipps agreed today when a reporter informed him of the city council's response.

Residents have been discussing the creation of a fire protection district and at a meeting this week agreed to consider an area that includes residents of the Westridge, LaDuke Road and Circle Bar Golf Course areas on the fringes of Westfir in a proposed district.

Phipps said whether or not residents of Westfir proper would be interested in encompassing a wider area is likely to depend on the potential for reducing fire insurance rates and increasing fire protection.

EUGENE REGISTER-GUARD

EUGENE, OREGON, FRIDAY, NOVEMBER 18, 1977

Terrified

I am terrified! Every time I start to drive through the railroad underpass in Glenwood and must face a huge chip truck, or maybe it's a giant cement truck, I get terrified. I have been known to stop and wait for the truck to pass through. Once I speeded up to get through first and got a ticket for speeding.

That stretch of highway is a major traffic carrier. That underpass is old, it is narrow, and I think it is an accident waiting to happen. Why can't it be rebuilt and widened?

What can we do about it?

I am terrified! Every time I drive over the Ferry Street overpass, facing two lanes of 40-mph traffic, separated only by a 6-inch high center divider, I am terrified of the potential there is for two cars filled with people to someday have a head-on collision. Or maybe it will be one of those giant cement trucks and an LTD bus. I've seen lots of accidents on that overpass. It, too, is a major traffic carrier and people drive fast. Ferry Street overpass is a bad accident waiting to happen. Why can't we have safe center dividers there like we have on I-105?

I drive terrified when I am at these two places. I would hate to someday say, "I told myself so!"

What can we do? I don't know, but today I am expressing my concern to others.

GORDON WRIGHT
5585 Fox Hollow Road
Eugene

Chance to Design a City

By Jerry Carroll

The telephone rang a week ago at 10:30 p.m. and when Henrik Bull picked it up, the voice on the other end of the line 2124 miles distant in Anchorage said, "Well, you're it."

The caller was Mort Hoppenfeld, the executive director of Alaska's nine-member Capital Site Planning Commission, and the news he had caused the uncorking of much champagne that night.

He said the architectural firm of Bull, Field, Volkmann, Stockwell and the planning firm of Sedway/Cooke, both of San Francisco, had won the competition to design Alaska's future capital city.

It was a long-shot victory in a high stakes contest in which the two companies, yoked together in a joint venture relationship, were competing against prestigious organizations dwarfing them in size for exclusive rights to a planner's dream.

What they won was a first-stage contract to design the outlines of a $2.5 billion city which will rise on what is now Alaskan Wilderness bounding with bear and beaver. The city will have 30,000 inhabitants by 1990.

"The exciting thing about it is the clean slate we have. Normally, projects are not so untouched by the hand of man," said John Field, 47, who, with Bull, 48, and Thomas Cooke, 44, led the group that won the prize.

The three of them recalled in an interview last week at BFVS's handsome offices in a former candy factory on Pacific avenue how they set about besting 160 rivals in winning the contract which could keep the partnership busy for more than a decade.

Alaska voters in 1976 chose a site 70 miles north of Anchorage for a new capital to replace Juneau, long criticized as a seat of government because of its remoteness from the rest of the state.

Bull heard by the grapevine that the state had in mind a contest to pick who would lay out the new city and design 1.3 million square feet of office space for government workers.

A letter was sent entering the San Francisco firms in the race and, after they survived an initial cut limiting the contenders to 11, the companies sent a delegation to Anchorage to give a 30-minute pitch listing their qualifications and the general approach they would take to the project.

After making their presentation, the various design teams were told to wait downstairs in a bar for the decision on which five would be finalists. "The tension in the bar was incredible," said Bull.

The finalists were given a helicopter ride around the future city and were handed what Field called "a tremendous amount of research material" about Alaska and Alaskans.

In addition to the usual topographical maps, aerial surveys, soil tests and other construction data, the planners and architects were schooled about the climactic furies which will beset the new city—winters where the sun never shines the temperatures drop 40 degrees below zero and 200 inches of snow can fall; and sizzling summers where night never falls to provide relief.

As importantly, the designers were asked to try to get inside the heads of Alaskans to understand their rugged individualism, love of nature and their passion for hunting and fishing and — tragically — the high incidence of alcoholism, child abuse and suicide.

"Some of these problems exist to a degree in all the northern countries," said Bull.

The solution, as the San Francisco group saw it, was to design a city that retains a flavor of wilderness at the same time it provides a sense of community to combat winter's awful isolation, the cause of so many of the north's social problems.

They proposed small buildings, no taller than the native birch trees, and lots of color to feed the senses when the the surrounding countryside is frozen and monochromatic. "The deprivation of color variety in winter is a problem they're acutely conscious of," said Field.

The contest-winning design envisions a city on a ridgeline with its eye always on the majesty of Mt. McKinley 90 miles distant. The far side of Desolation creek nearby will be left undeveloped and summer and winter lakes will be created out of bogs.

Within its 4 ½ mile length and 1 ½ mile width are 20 to 40 home "micro-neighborhoods" in which residences will be no farther than a thousand feet from buses which will operate two minutes apart during commute periods.

Each of these will connect with neighborhood centers with schools and recreational areas, district centers and town centers. Everything will be connected with trails for snowmobiling and hiking.

According to Field, the design is a "highly romantic view at first blush" of Alaska, but said it is underpinned by "simple logic."

To win the contest, the two firms had teams that were putting in 16-hour days as the deadline approached for submission. "We were meeting sometimes twice a day. It seemed like a lot of talk, but the clarity of what we did came from that," Field said.

Winning the contest has given the two companies a new lustre in their fields and will require the addition of staff. "It's a tremendous opportunity," said Field.

San Francisco Chronicle

★ Sat., Dec. 24, 1977

ACTIVITIES

FACILITATING NOTES

The activities for this section require a great deal of reading and discussion. Teachers should be reminded that it is important for them to comprehend this and the previous section (#5) in order to complete the UPCOMING INTEGRATION MATERIALS.

OBJECTIVES:	(l)	Understand some general notions of an approach to urban design.
	(m)	Understand two basic patterns of urban growth which can be addressed in design and planning.

TO DO: Review the Section text and answer the following questions.

1. What are relative and normative standards of value? Give examples of each.

2. What is the purpose of using a design approach to making decisions about our cities?

3. How can designers and planners respect the natural attributes of a landscape?

4. What are some examples of the "free work of nature" which can be utilized in an urban setting?

5. What are some problems caused by internal urban development?

6. Give some examples of current or proposed solutions to internal urban growth problems. What are their implications?

7. How does external growth of cities occur? Cite some examples of metropolitan sprawl from your own experience.

8. Discuss some attitudes which you think are reflected in the development of "typical" suburbs.

READINGS: Whyte, William H. The Last Landscape, 1970, Ch. 2, pp. 17-36.

Dantzig, George B.; and Saaty, Thomas L. Compact City, 1973, Ch. 1, pp. 1-14.

Stearns, Forrest W.; and Montag, Tom, ed. The Urban Ecosystems, 1974, pp. 15-31.

OPTIONAL READING: SHEPARD, PAUL. MAN IN THE LANDSCAPE, 1967, Ch. 2, pp. 26-62.

TO DO: Collect a few articles from newspaper or magazines that exemplify urban design and/or planning issues.

Refer to the Section text on design and planning and discuss these articles and those on pp. 150-156 in terms of the following:

1. Indicate which of the five parts of the design process discussed on p. 133 are addressed in these articles.
2. Which articles exemplify an anticipatory planning process? Discuss your reasons for deciding this.
3. In which examples is anticipatory planning not in evidence? Why?

The written text, readings and activities of the INQUIRY were organized and presented for the purpose of providing you with a knowledge base about the urban ecosystem. It would be useful now to review as a group the goals stated at the beginning of the INQUIRY before proceeding to the INTEGRATION.

As a group, have you covered the material comprehensively enough to understand the following:

1. The formation and development of the urban place?
2. The needs and perceptions that shape the relationships between people and things in everyday urban life?
3. Some conceptual tools for examining the structure and processes of the urban place?
4. The energy requirements of the urban ecosystem?
5. The dimensions of quality of life in the urban setting?
6. The importance of urban planning and design?

INTEGRATION
involves the teacher in the planning, design, and decision-making processes for assessing and improving the urban place.

INTEGRATION

With the INTEGRATION materials teachers will examine the quality of their own urban setting and plan a more trouble-free living environment.

1. The group will choose a problem area, go through an information-gathering process, and complete the urban design and planning activities by reviewing the scope and quality described in the final checklist on page 195.

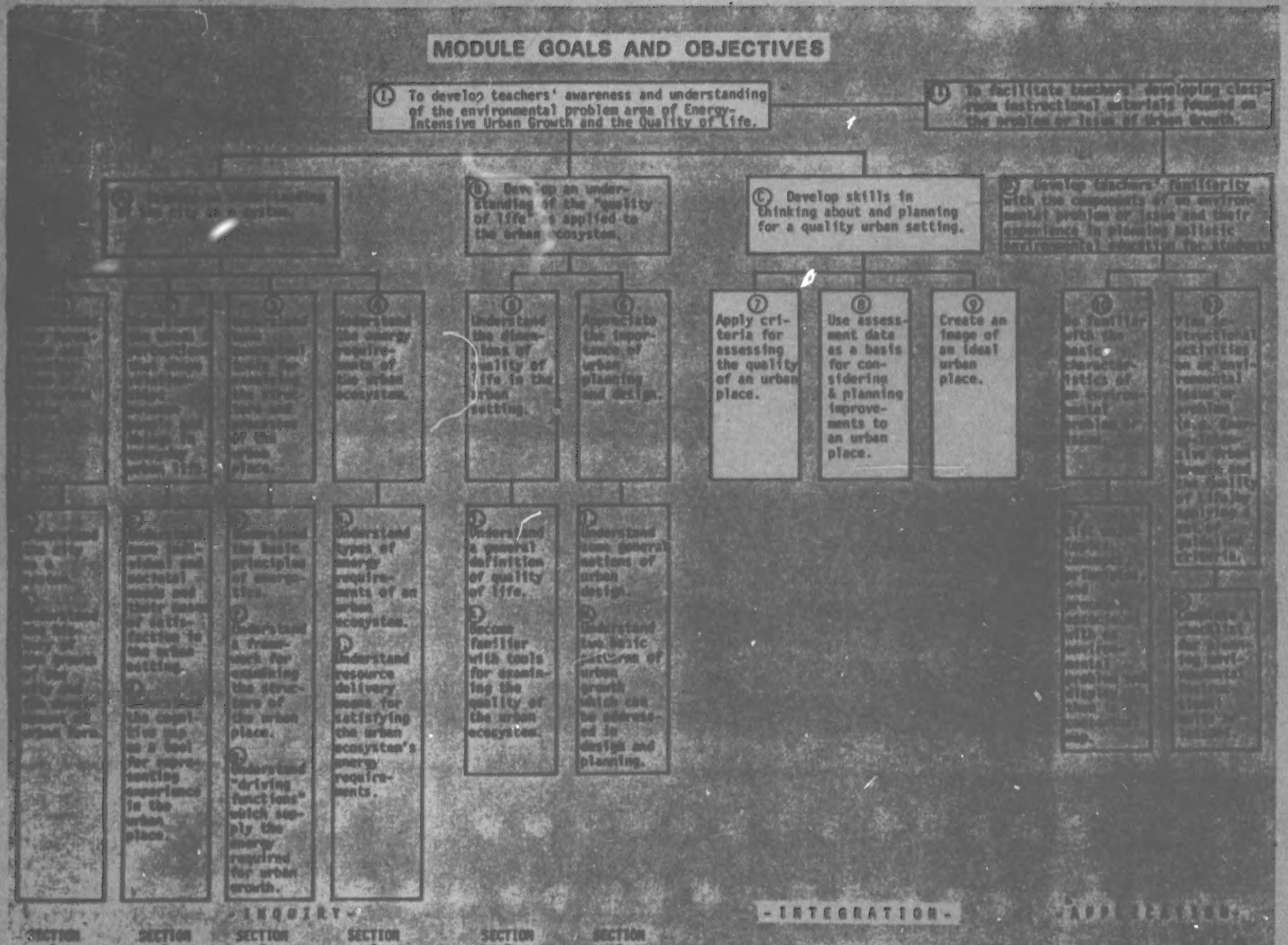
2. Estimated time to complete the INTEGRATION is 10-12 hours.

3. Refer to the Quality of Life categories for suggestions of where to find information for your Quality of Life assessment. For the design activities you may want to gather some art materials (large paper, markers, boxes, styrofoam, cans, photography equipment, acetate overlay materials, etc.), depending on the time and finances available.

4. Teachers may spend too much time collecting data/information and not enough time using it in the planning and design process. Also, teachers may have trouble getting accurate information from agencies, organizations, etc.

The Module's Goals and Objectives Chart follows. Only those goals relevant to information presented in the INTEGRATION are highlighted.

MODULE GOALS AND OBJECTIVES


① To develop teachers' awareness and understanding of the environmental problem area of Energy-Intensive Urban Growth and the Quality of Life.
⑩ To facilitate teachers' developing classroom instructional materials focused on the problem or issue of Urban Growth.
B Develop an understanding of the "quality of life" as applied to the urban ecosystem.
C Develop skills in thinking about and planning for a quality urban setting.
D Develop teachers' familiarity with the components of an environmental problem or issue and their experience in planning holistic environmental education for students.
④ Understand the energy requirements of the urban ecosystem.
⑤ Understand the dimensions of quality of life in the urban setting.
⑥ Appreciate the importance of urban planning and design.
⑦ Apply criteria for assessing the quality of an urban place.
⑧ Use assessment data as a basis for considering & planning improvements to an urban place.
⑨ Create an image of an ideal urban place.
⑩ Be familiar with the basic characteristics of an environmental problem or issue.
⑪ Plan instructional activities on an environmental issue or problem (e.g. Energy-intensive urban growth and the quality of life) applying a variety of content criteria.
④ Understand types of energy requirements of an urban ecosystem.
Understand resource delivery means for satisfying the urban ecosystem's energy requirements.
⑤ Understand a general definition of quality of life.
Become familiar with tools for examining the quality of the urban ecosystem.
⑥ Understand some general notions of urban design.
Understand two basic patterns of urban growth which can be addressed in design and planning.
- INQUIRY -
- INTEGRATION -
SECTION 1
SECTION 2
SECTION 3
SECTION 4
SECTION 5
SECTION 6

INTEGRATION

The purpose of this INTEGRATION is to engage you in the design and planning process of a quality urban setting in order to understand the aspects necessarily involved.

The INTEGRATION contains three exercises for teachers to complete:

1. An assessment of a selected urban area in terms of quality of life considerations.
2. Using assessment data as a basis for considering and planning improvements to an urban place.
3. Creating an image of an ideal urban place.

After completing the INTEGRATION, you will:

(7) Develop and/or increase skills in thinking about, assessing and planning for a quality urban setting.

FACILITATING NOTES

Go over the steps of the activity to make sure you understand the scope of the exercise.

The group should define their selected area as specifically as possible; otherwise, you wind up accumupating more information and data than you need.

For the information gathering activity, teacher sub-groups or individuals might help each other by staying on the lookout for information relevant to others' quality of life indicator categories.

Do not exceed the time allotted for collecting data/information. Make certain you have enough time to utilize the data in completing the planning and design activity.

Teachers may have trouble getting <u>any</u> information from certain individuals, agencies and organizations as well as trouble with information accuracy. Try more then one source for the same kind of information.

Make certain that the group again scans the newspaper articles in Sections 5 and 6 before proceeding with the Quality of Life Assessment. It may also be helpful, if time permits, for teachers to bring in local articles about urban growth concerns.

SECTION 1

URBAN QUALITY ASSESSMENT

OBJECTIVE:

(7) Apply criteria for assessing the quality of an urban place.

This section allows teachers to apply a Quality of Life rating scale to a designated urban area. As a group, select a local urban setting and choose at least two indicators from each of the eight Quality of Life assessment categories to apply to this urban area. A larger group may choose more indicators, according to the group's capabilities and time constraints.

In order to do a comprehensive assessment, the group should gather information from some of the various public or private agencies, or individuals that are listed for the selected indicators. The group then comprises the Quality of Life assessment using the data acquired.

a. Defining the Urban Setting

When defining an area to investigate, consider the following:

> What are the spatial boundaries of your selected urban ecosystem? Are you looking at a small neighborhood, a whole community, a city, or a larger metropolitan area?

Your group will have to describe your area specifically enough so that you can organize appropriate information and disregard irrelevant data. A cognitive map of the area like the one you made in Section 2 of this module may help your group decide how large an area is feasible to investigate.

b. Choosing Indicators

We have developed some idea of what kinds of indicators are useful in investigating different aspects or dimensions of quality of life. From the Section 5 discussion, choose at least two indicators from each of the 8 categories for your assessment.

1. Urban Energy Efficiency
2. State of the Natural Environment
3. Access to Amenities
4. Livability of Climate (optional)
5. Citizen Influence and Community Control
6. Access to Public Services
7. Level of Public Health
8. Economic Opportunity

c. A Primary Assessment

The next step in this activity will be to complete the Quality of Life Rating Scale using the indicators you have chosen to study. This assessment should be brief, based at this point only on your current knowledge and intuitive feelings about the place.

Fill in the Rating Scale below with selected indicators and check off the apporpriate rating for each one:

QUALITY OF LIFE RATING SCALE

Indicators	Quality of Life Categories	Outstanding 5	Good 4	Adequate 3	Below Par 2	Poor 1	Category Rating*
	Urban Energy Efficiency						
1							
2							
3							
4							
	State of the Natural Environment						
1							
2							
3							
4							
	Access to Amenities						
1							
2							
3							
4							
	Access to Public Services						
1							
2							
3							
4							
	Level of Public Health						
1							
2							
3							
4							
	Citizen Influence						
1							
2							
3							
4							
	Economic Opportunity						
1							
2							
3							
4							
	Livability of Climate (optional)						
1							
2							
3							
4							

*This overall Category Rating is obtained by totalling the values of the two or more category indicators and dividing by the number of indicators used.

d. Gathering Information

Your group's task here is to search for objective data (or knowledgeable opinions) relevant to your chosen indicators; these will be used to generate a more informed opinion regarding the Quality of Life of your urban place. This can be done by assigning individual responsibilities for gathering data on one or several indicators. The results of the evaluation here will be useful later in dealing with urban growth problems in your area. The following are some points to consider while conducting your investigations:

(1) Parameters of the Investigation

It is important to remember that there is probably an overabundance of available data for most indicators. In being selective, then, consider the following:

Limit the span of time you are investigating

Limit the number of things you find out about each indicator

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(2) Remember some notions about ecosystems...

Remember that urban ecosystems are dynamic systems, and that they are constantly changing. It is necessary to keep in mind the following points:

(a) The conditions under which observations are made and data collected at any one particular time may be very different from the conditions observed at another time.

(b) Parts of ecosystems may be sensitive to intrusion, this includes observation from investigators. Some neighborhoods are likely to resent people asking questions. Some organizations may not want to give out data to the public. These problems in themselves may help you form opinions about certain indicators.

(c) Often incorrect data is reported or correct data is misreported or misinterpreted. Check for accurary by making multiple observations or checking information against more than one source, if possible. Another consideration: offices may only tell you what they want the "public" to know. If a vital piece of information is lacking, try again or cross-check with another person or organization.

(d) Some indicators are purely subjective and the information that is valuable can only be found by asking how people feel about it, for example, information about visual quality or climate preferences.

(3) Where to Get Information

Following is a brief listing of places to go and people to see for information about each quality of life category.

Where To Get Information... Urban Energy Efficiency

- State/Local Environmental Quality Agencies: environmental impact reports on new construction, water quality, air pollution; other urban change indices
- Department of Public Works: new installations and use of older street pipe systems
- State Department of Transportation or Local Transit Authority: transportation use; new or old vehicles, how many, how much fuel, over what period of time; fuel efficiency
- State or Local Energy Agencies: any information on urban energy requirements over time; what fuels to what urban sectors
- City/County Planning Departments: land use and building occupancies; new or proposed building sites; upkeep and maintenance on government buildings
- Police, Fire, Ambulance: use of vehicles, by whom, how much fuel, how often maintained; buildings and maintenance of their structures
- Oil Companies: gasoline purchases: by whom, how much, for what; plant siting and building heating, cooling, maintenance
- Natural Gas Companies: purchases: by whom, how much, for what; seasonal variations; location variations; plant siting and building heating, cooling, maintenance
- Electric Utilities: same as oil and gas
- Water Companies: same as oil and gas
- City/County Meteorologists: rainfall and amount recaptured: microclimate variables; heat changes related to locale in urban area
- Air Quality Boards: air pollutants related to locale in urban area
- Department of Parks and Recreation (State, local, national): location and use of parks; maps; maintenance
- Colleges and Universities: Departments of Meteorology, Architecture, Landscape Architecture, Business and Administration
- Local Businesses: engineering firms, architects, landscape architects, construction companies, electrical engineers, heating and cooling equipment companies and installers, private or public interest groups dealing with energy and environment

Where To Get Information... State of the Natural Environment

- U.S. Environmental Protection Agency: legislation; compliance; air and water quality; noise levels; radiation levels; environmental impact reports
- State and Local Environmental Quality Agencies: not all cities or counties will have such an agency; larger ones will have at least air and water monitoring, such as an Air Resources Board, and information on environmental impact.
- Department of Public Works: water treatment plants; sewage treatment; landfill
- Water Districts: dams; water table information; water conditions
- State/Local Departments of Parks and Recreation: local parks; protection and management; ecological information
- U.S. Department of Agriculture: pesticide use and controls; effects on people, animals, fish, vegetation
- Transit Authority: fuel consumption by public transit
- Oil Companies: gasoline purchases: by whom, how much, for what, when; heat loss; fuel efficiency
- Natural Gas Companies: same as oil companies
- Medical Centers: causes of eye irritation; other effects of pollutants
- City/County Planning Departments: land use; soils; geography; environmental impact reports
- Bureau of Land Management: renewability of natural resources; protection and management of wildlife and scenic resources
- Coastal Commission or River Commission: same as Land Management
- Forest Service: same as Land Management
- Colleges and Universities: Departments of Landscape Architecture, Geology, Forestry, Park Management
- Local Businesses: fisheries; farmers; special interest groups: Sierra Club, other conservation organizations

Where To Get Information... Access to Amenities

- U.S. Department of Housing and Urban Development: population and residential density
- Local Housing Authority: residential density of small areas
- Bureau of the Census: population density; composition
- Realtors, Realty Associations: population trends; housing information
- State/local Departments of Parks and Recreation: open space, park programs
- City/County Planning Departments: design studies; planned open spaces; community centers
- Board of Education: extra-curricular events; programs for children and adults
- Council on Environmental Quality: conditions of local recreational areas; environmental impact reports
- Transit Authority: public transportation systems; car pool information; special transportation programs for seniors, handicapped, etc.
- City/County/State Cultural Organizations: programs; events information; availability; prices; special programs or events
- City Tourist Information Bureau: events; accessibility; package deals
- Colleges and Universities: cultural arts information; museum: Departments of Education and Media
- Local Businesses: design firms; arts associations; dance studios; cab companies; charter buses; ferries; amusement parks; hiking clubs; golf courses.

Where To Get Information... Livability of Climate

- Weather Bureaus: U.S. Meterological Survey, predictions, charts, maps; airport control towers
- NASA: predictions; satellite charts, maps
- U.S. Department of Agriculture: crop failures; types of vegetation; pesticides; pollution effects
- U.S. Forest Service: recreational conditions, flooding; ecological information
- Bureau of Land Management: same as Forest Service
- City/County Planning Department: general plans include a section on local weather conditions over time
- City/County Department of Public Works: street maintenance in relation to weather conditions
- State Department of Highways: road conditions per season; hazardous conditions; maintenance per season
- Port Authority: storm information; storm damage information
- City/County Departments of Parks and Recreation: problems in plant propagation; park maintenance due to weather and climate; pollution conditions
- City/County/State Tourist Information Department.
- Local Colleges and Universities: Departments of Landscape Architecture, Environmental Studies, Meteorology
- Local Businesses: nurseries; landscapers; recreation and sports suppliers; farmers; marketing and advertising firms

Where To Get Information... Citizen Influence and Community Control

- Board of Elections: any local or national/state election information: who votes, where, registered parties; campaign information; financing legislation
- League of Women Voters: party platforms; issues; candidates
- Volunteer Organizations: political groups; consumer agencies; lobbying groups
- Charity Organizations: United Way, Red Cross
- City Hall: local officials, office hours; accessibility; Board of Supervisors; committees; lobbying groups
- State Senators, representatives: same as local
- Circuit Courts: judicial rulings; public hearings; judicial reversals; court backlog
- Utilities, Coastal Commissions: public hearings; attendance; publication
- Prison Systems: crime rates, court backlog; prison conditions
- Legal Aid Organizations: extent and use of services, to whom, for what, when; accessibility
- National Urban League: community outreach programs; environmental projects; renewal efforts
- Community-focused Groups: Institute of Local Self-Reliance, Institute for Local Self-Government; activities; centers; programs; community centers; use and availability of facilities; community patrols: litter, crime; local chapters of Boy Scouts, Girl Scouts, etc.
- Newspapers and Local Publications: community events; redevelopment efforts
- City/County Planning Departments: population distribution and ethnic patterns
- Colleges and Universities: community outreach programs; attitudes about location
- Local Businesses: success of local business; problems and areas of concern; new businesses; neighborhood redevelopment efforts; support from local government; business associations

Where To Get Information... Access to Public Services

- Utility Districts (Gas, power and light companies): rates; distribution of services; maintenance of utility systems; maintenance problems
- Telephone Companies: same as utilities
- Public Utility Commission: rate legislation; compliance
- Department of Sanitation: garbage services; access, pricings; distribution of services
- Department of Public Works: location of sewer system; maintenance
- Transit Authority: transportation systems; access to public buildings
- City/County Planning Department: maps, plans for location of public buildings; transportation patterns and problems; special access programs and problems
- U.S./State/County Department of Health, Education and Welfare: programs for seniors and handicapped; children's services
- Board of Education: location and population distribution of schools; community outreach services; studies in educational quality; teacher training; bus systems
- City/County Library System: information dissemination; outreach services; special programs, film programs
- Fire, Police, Ambulance: distribution of services; uses of services; frequency of calls; answer-time.
- Colleges and Universities: program information; adult and continuing education programs; community outreach programs
- Local Businesses: volunteer organizations; cab companies; TV and radio stations

Where To Get Information... Level of Public Health

- State/Local Departments of Public Health: public health programs; special programs; distribution of services; availability
- State/Local Boards of Health: health problems in area, financial information
- City/County Medical Services, Welfare Departments: seniors, chidren's services; welfare caseload; Medi-care; drug and alcohol rehabilitation programs
- U.S. Department of Health, Education, Welfare: studies; statistics
- Board of Education: health education programs; community outreach services; uses of school facilities by public
- Local Medical Associations: distribution and quality of services
- Police, Fire, Ambulance, Red Cross: distribution of types of services; use of services
- Hospitals, Mental hospitals: caseload; types of cases; quality and extent of services; doctors from outside, outreach programs; counseling and referral services
- "Alternative" Health Centers: extent and use of services; counseling and referral services
- Convalescent Homes, Child Care Centers: types of referrals; extent and use of medical, nursing facilities
- Environmental Protection Agency and Local Environmental Quality Agencies: pollutants and effects
- Food and Drug Administration: current drug usage; pharmaceutical problems; recalls; toxic substances; food quality; contaminants
- Public Interest Groups: community nutrition organizations; drug information centers; health research projects; consumer groups
- Health Facilities: private health clubs, extent and use of services; public outreach programs
- Department of Parks and Recreation: uses of community facilities, parks, swimming pools, jogging courses, other resources
- Colleges and Universities: Departments of Health, Physical Education, Recreation; Psychology, Environmental Studies
- Local Businesses: pharmacies, drug stores, health food stores, herbalists

Where To Get Information... Economic Opportunity

- U. S. Department of Labor: employment, unemployment statistics; distribution patterns; changes over time
- State/County Employment Development Department: types of available employment; statistics; financial information
- Manpower: extent and types of services; referrals; use of services
- Board of Education: continuing and vocational education programs; employment counseling and referral services
- City/County Planning Departments: growth management plans; population/employment distribution; commercial, industrial patterns and changes over time; diversity of business in area; local economic base; past economic disasters (e.g., Boeing in Seattle)
- Banks, Savings and Loan Institutions: loan patterns: who, why, when, how; credit information
- Businessmen's Associations: development opportunity; new business success; independents/conglomerate information
- State/County/City Tax Assessor: tax base; uses of tax monies; distribution patterns; what is taxed?
- Taxpayers' Association: lobbying issues; satisfaction levels; problem areas
- Unions: labor issues; wage disputes; successes and failures
- Newspapers and Publications: employment opportunities; housing prices; stock averages
- Colleges and Universities: Departments of Business Administration, Economics, Political Science
- Local Businesses: food stores, prices, fluctuations; restaurants and bars; toy stores; building supplies: "do-it-yourself" trends; contractors and builders: indicators of influx, financial status of area

QUALITY OF LIFE RATING SCALE

Indicators	Quality of Life Categories	Outstanding 5	Good 4	Adequate 3	Below Par 2	Poor 1	Category Rating*
	Urban Energy Efficiency						
1							
2							
3							
4							
	State of the Natural Environment						
1							
2							
3							
4							
	Access to Amenities						
1							
2							
3							
4							
	Access to Public Services						
1							
2							
3							
4							
	Level of Public Health						
1							
2							
3							
4							
	Citizen Influence						
1							
2							
3							
4							
	Economic Opportunity						
1							
2							
3							
4							
	Livability of Climate (optional)						
1							
2							
3							
4							

*This overall Category Rating is obtained by totalling the values of the two or more category indicators and dividing by the number of indicators used.

FACILITATING NOTES

For Section 2, you are encouraged to bring art materials from home for making a model. The greater the variety of materials you have to work with, the better you can portray your design plans.

Make sure to refer back to indicated text sections, or if not, that the concepts referred to are understood clearly.

Check the final report for comprehensiveness, its thorough coverage of planning steps a-c, and the summary/conclusion.

SECTION 2

PLANNING URBAN IMPROVEMENTS

OBJECTIVE:

(8) Use assessment data as a basis for considering and planning improvements to an urban place.

This activity uses the information gathered in Section 1's exercises to plan improvements for your selected urban place. Your group should indicate where improvements are needed based on the Quality of Life ratings for your urban place. Choose specific improvements that would enhance the quality of life in your selected area. This may range from redesigning the commuter transportation patterns (by eliminating automobiles from a downtown area) to redirecting tax monies to provide for more public parks in city areas.

Approach this planning process by asking what can be done for the future to ensure your enjoyment in living and working in the area.

The planning steps are outlined below.

PLANNING STEPS

A. Spatial Definition... A Simple Map

(1) Define the spatial boundaries of your urban ecosystem. Create a simple map of the place the way it currently appears physically. You may have found a good simple map during your investigations that you can trace or use as is.

(2) Refer back to Section 2 in the INQUIRY. Note on the map above (or mentally note) the most important physical characteristics of your urban place. What parts of the city do people feel are vital to the city's character? These can be natural or human-created aspects.

(3) Your map can be more elaborate than simply a drawing. You can use styrofoam, cardboard boxes, or other materials to create a three-dimensional model on a table or on the floor. Obviously, the amount of time you have available is important here.

B. Energetics Definition . . . Energy Flow Diagram

(1) Refer back to Section 3 of the INQUIRY and review the text on Energetics, Ekistics, and Driving Functions. Also refer to the sample energy diagrams and your completed exercises.

(2) Create an energy flow diagram of your urban ecosystem, refer to Section 3, p. 73. This will provide you with a display of the relationships between urban elements and also help to clarify energy input and output requirements. Indicate the elements of <u>your</u> city system with specific examples. For instance, the transportation system may also transport the city's food from regional agricultural areas or from out of state or out of country.

(3) This diagram also may be more elaborate, using three dimensional surfaces instead of a flat diagram. Color coding is also useful in following energy inputs and networks through the city system.

C. Problem Definition

(1) Examine the most important areas for urban improvement. List specific problems your group chooses to deal with. List some alternative solutions for each.

(2) Using the tools you have created and the information you have gathered (maps, charts, etc.), discuss the merits and flaws of your proposed solutions. Add any other pertinent information, graphic displays or photographs, as necessary, to add to your discussions. Your group may want to break into smaller subgroups and address one of two problem areas each.

D. Summary and Conclusions

Create a <u>group report</u>, outlining the proposed changes, and their implications for the entire urban ecosystem, using any media you believe will make your points clear and convincing. Include an indication of possible <u>long-term effects</u> of these changes and possible <u>future problems</u> which may occur as a result of these changes.

Use this checklist to ensure the comprehensiveness of your urban plan. If you have not addressed any of these aspects, go back to your plan and cover these.

- How well does your urban plan address various aspects of Quality of life?

  1. Does the plan make use of outside information resources pertinent to each of the selected indicator categories? _____
  2. Does the plan consider legal and ethical aspects? _____
  3. Economic aspects? _____
  4. Aesthetic aspects? _____
  5. Psychological or social aspects (e.g., mental and physical health, crowding, etc.)? _____

- Does your urban plan consider future urban growth?

  6. Does the plan address types of urban growth (e.g., population, transportation, commercial, etc.)? _____
  7. Does the plan address rates of growth with respect to these types? _____
  8. Does the plan address patterns of growth (location and distribution) with respect to these types? _____

- Does your plan reflect a consideration of the city as an ecosystem?

  9. Does the plan address the means of satisfying the energy requirements for your urban place (including energy to produce food, to provide water, electricity, building structures, etc.)? _____
  10. Does the plan address the implications of using renewable or non-renewable resources to satisfy these energy requirements? _____

- Does your plan reflect a consideration of the short and long-term environmental impact of urban growth?

  11. Does the plan attempt to maintain urban diversity and flexibility? _____
  12. Does the plan address the carrying capacity of the natural system in which the urban area is embedded? _____
  13. Does the plan address the environmental impacts of the planned urban system on natural systems? _____

SECTION 3

FACILITATING NOTES

When completed, this Section should be very flexible in terms of the range of possible urban images. Be as free as possible; encourage diverse ideas about spatial/geographical setting and the composition of urban elements.

It is possible to either (a) suggest such diverse alternative solutions that it is hard to resolve a final plan, or (b) become too limited by one or two alternatives.

As the group completes the final report, use the Quality of Life Indicator Categories (p. 103) as a checkpoint for comprehensiveness.

As in Section 2, the greater variety of art materials you have to work with, the better you can portray your urban design plans.

SECTION 3

AN URBAN IMAGE FOR THE FUTURE

OBJECTIVE:

(9) Create an image of an ideal urban place

You have now studied aspects of energy-intensive urban growth, explored and analyzed current conditions of a specific urban place, evaluated these aspects in relation to your values about quality of life, and planned specific improvements to urban quality. It is important as a final step to use this information as a spring-board from which to approach the possibilities for the urban future.

As we have seen in the planning process, problems and ideas provide input into design, from which solutions to current problems and alternatives for future urban form(s) evolve.

Following are directions for a design activity that will help you create a concrete image of an ideal urban ecosystem.

A. Spatial/Geographical Definition

(1) Refer to an Atlas or topographical maps of local or regional settings you think are conducive to urban settlement. These may or may not already have an urban settlement. The group can then choose an area upon which to base your urban image. It is most helpful if there is data available on weather cycles, general climate conditions, general soil composition, and natural vegetation.

(2) Using this data, define the geographical location and spatial boundaries of your city. Indicate distances (how many miles across, around, etc.) and compass directions.

(3) Draw a large map (on butcher paper, or a blackboard) or build a three dimensional model of the city. Outline the natural features in as much detail as you can; these will determine many of the energy characteristics of the city.

B. Energetics Definition

(1) Using the 5 Ekistics elements, describe your urban place in the following manner. For a comprehensive explanation of the 5 elements of EKISTICS, refer to SECTION 3 of the INQUIRY, pp. 64-65.

- Nature: A general description of the natural terrain, the amount of surface water (rivers, lakes, etc.), the wind directions, overall climate information, and possible wildlife inhabiting the area.
- Man or Humanity: Ideal population size your group wishes to start with, if possible an indication of age distribution.
- Society: The institutions which are created to deal with the population and its activities. For example, what is the type of governing body for your city? Elected or appointed officials? The general types of services needed? The major businesses or income sources of the populace? Be as thorough as you can.
- Shells: How will your group house people? List the types of human activities which require built structures.
- Networks: List the networks of the city as described on pp. 65-66.

(2) Refer to Section 3, INQUIRY, Energetics Exercise, p. 77. Follow these directions for creating an energy diagram of your ideal urban place.

Using the lists from B.(1) above, complete the following chart for your urban ecosystem:

inputs or resources	storages	producers	consumers	outputs

Decide if your ideal urban place relies on any imports or is a self-sufficient system, and indicate recycling accordingly.

(3) Examine the "driving functions" of your city. (Refer to INQUIRY, Section 3, p. 68). How will the driving functions effect or change the original form of your ideal city?

Imagine your city has to accomodate a one-third increase in population in seven years. Explain the driving functions which will provide necessary energies to accomodate this growth.

C. Definition of Alternatives

(1) Examine alternative ideas for your urban place, make written suggestions, and discuss the merits and flaws of each, using the tools you have created--maps, charts, or any other pertinent information.

(2) Discuss possible problem areas: For example, how will your urban ecosystem handle increases in population from births and influx? What about possible "problems of success"? For example, what are the business, governmental, and financial implications of creating a "successful" solar-powered community? Or, what considerations must be taken into account when promoting bicycles as a major form of transportation?

D. Summary and Conclusions

Create a written group report, outlining the major points of interest about your ideal urban place (in terms of an ecosystemic approach). Indicate the implications of its salient features for the long-term: in terms of its own urban form and in terms of effects on the surrounding area. Use any media you believe will make your points clear and convincing; include charts, maps, etc.

Use this checklist to ensure the comprehensiveness of your urban plan. If you have not addressed any of these aspects, go back to your plan and cover these.

- Does your urban plan address various aspects of Quality of Life

  1. Does the plan make use of outside information resources pertinent to each of the selected indicator categories? _____
  2. Does the plan consider legal and ethical aspects? _____
  3. Economic aspects? _____
  4. Aesthetic aspects? _____
  5. Psychological or social aspects (e.g., mental and physical health, crowding, etc.)? _____

- Does your urban design plan for future urban growth?

  6. Does the plan address types of urban growth (e.g., population, transportation, commercial, etc.)? _____
  7. Does the plan address rates of growth with respect to these types? _____
  8. Does the plan address patterns of growth (location and distribution) with respect to these types? _____

- Does your plan reflect a consideration of the city as an ecosystem?

  9. Does the plan address the means of satisfying the energy requirements for your urban place (including energy to produce food, to provide water, electricity, building structures, etc.)? _____
  10. Does the plan address the implications of using renewable or non-renewable resources to satisfy these energy requirements? _____

- Does your plan reflect a consideration of the short and long-term environmental implications of urban growth?

11. Does the plan attempt to maintain urban diversity and flexibility? _____

12. Does the plan address the carrying capacity of the natural system in which the urban area is embedded? _____

13. Does the plan address the environmental impacts of the planned urban system on natural systems? _____

Before proceeding with the APPLICATION, it may be useful to review, as a group, the goals and objectives for the INQUIRY and INTEGRATION.

As a group have you covered the material comprehensively enough to:

- Develop skills in thinking about and planning for a quality urban setting?
- Apply criteria for assessing the quality of an urban place?
- Use assessment data as a basis for considering and planning improvements to an urban place?
- Create an image of an ideal urban place?

APPLICATION presents a set of guidelines for planning and implementing instructional programs on the nature of Energy-Intensive Urban Growth and the Quality of Life

APPLICATION

1. You should begin by reading through the entire APPLICATION (The Appendices are optional).

2. If the group feels the need to agree upon a definition of environmental education (EE) before beginning the instructional planning process, you can start by reviewing the definition provided in the module PREFACE, page x. You should be aware that EE can also be thought of as:

   - the study of everything--nature, humankind, all disciplines and fields of knowledge;
   - the study of human beings' interaction with nature (the biosphere);
   - the study of the relationships between nature and human systems; and
   - the study of reciprocal or optimal ways to manage the relationships between natural and human systems.

3. "Warm up" to the planning process by discussing and selecting some aspects of Energy Intensive Urban Growth and the Quality of Life which interest you and might interest your students. Consider how the environmental problem issue of urban growth relates to your own professional subject area. For example, you might start the planning task by identifying urban growth topics, concepts, and principles which are compatible with your subject area; the possibilities might include: human-nature interactions, net energy and energy quality, cycles, world views, social and economic constraints, etc.

4. Keep in mind that, when planning the student learning activities, the ultimate goal of the instructional plan is to develop in students a level of awareness and understanding regarding urban growth that approaches the level you and the other teachers achieved after completing the INQUIRY and INTEGRATION materials.

5. You can begin planning an environmental instructional unit or lesson for your students by using:

   - the contextual map you developed in the Activity; and
   - the checklist to ensure the adequacy of your instructional plan.

6. Remember, you can utilize the planning checklist in any one of the three ways recommended on p. 220.

7. You can create a unit plan in one of the following ways (whichever is the most comfortable for you):

   - Work individually at first; then share and refine your ideas and plans in a group discussion.
   - Work with another person at first, then share and refine your ideas and plans in a whole group discussion.
   - Work in a whole group to develop a common plan which each teacher can live with and carry out in his/her classroom.

   You should find these group discussions most helpful in: (a) sharing ideas and suggestions, and (b) developing a common set of "notes" which can be used subsequently to select specific instructional materials from or to develop more detailed, classroom-ready environmental, energy-focused activities for your students.

8. You should set a specific time limit (1 week, 3 weeks, 6 weeks, etc.) for your unit--even though this time limit may be changed later--since doing so will help provide you with some concrete limits within which to plan student learning experiences.

9. Remember to specify a particular <u>setting</u> (local, state, regional, etc.) and <u>problem focus</u> in which you might want your students to examine urban growth topics, concepts, and principles.

10. If you and the other teachers have developed individual instructional plans, go over them in a <u>group discussion</u> and compare them with the guidelines in the checklist. In particular, you should make certain that your plans are specific regarding:

    - the problem context--including topics, concepts, processes that will be covered or utilized (Note: these should address at least some of the topic-and process-oriented contents identified on p. 209.
    - instructional aims or learning objectives;
    - learning resources (readings, people, exercises/activities);
    - evaluation criteria and procedures;
    - time schedule or sequence for learning activities.

11. Do not avoid this planning activity on the basis of your intention or desire to later explore with your students some urban problem/topic areas compatible with their interests. You will find that your initial planning efforts, though tentative, will pay off by better helping you to prepare for implementing environmental education in your classroom.

The Module's Goals and Objectives Chart follows. Only those goals and objectives relevant to information presented in the APPLICATION are highlighted.

PAGE 203 DELETED PRIOR TO BEING SHIPPED TO EDRS
FOR FILMING DUE TO POOR REPRODUCIBILITY.

APPLICATION

This APPLICATION provides you with an opportunity to plan an environmental instructional unit(s) or lesson(s) for classroom use which are holistic, transdisciplinary, and issue-focused. The APPLICATION, then, constitutes an exercise in designing a learning experience or set of experiences which raises students' levels of awareness and understanding of Energy Intensive Urban Growth and the Quality of Life.

The APPLICATION in two sections presents:

The Environmental Problem Context--this section describes the general characteristics of an environmental problem or issue as the primary focus for an instructional unit or lesson.

Checklist for Planning Environmental/Energy-Focused Instructional Units or Lessons--

This section presents guideline questions for planning and developing environmental problem-focused instructional materials and activities.

After completing the APPLICATION section, you should:

(D) Have a familiarity with the components of an environmental problem or issue context, and experience in planning holistic environmental education instruction and learning for students.

SECTION 1

THE ENVIRONMENTAL PROBLEM CONTEXT

After completing this section, you should:

(10) Be familiar with the basic characteristics of an environmental issue context.

Before beginning the instructional planning process, it is useful to examine those aspects of an environmental, energy-focused problem context considered by curriculum designers to be suitable for increasing students' broad understanding of energy and environmental problems and issues.

An environmental problem context which is suitable or appropriate for students must involve the following:

a. An issue of national priority

b. A setting of environmental interest

c. Topic/process oriented content

d. A contextual map

A MAJOR GOAL OF ENVIRONMENTAL EDUCATION IS TO DEVELOP IN LEARNERS AN AWARENESS AND BROAD UNDERSTANDING OF ISSUES OF NATIONAL PRIORITY

a. An issue of national priority represents a major environmental issue or problem which is or should be of concern to our national, state, and local leaders...and to citizens in general. Such an issue is broad in impact and complex in nature. Resolution of the issue involves an ongoing process of making and changing policies, regulations, and legislation, and of altering personal values and lifestyles.

In general, an environmental, energy-focused issue of national priority arises from what might be called the "new scarcity" which reflects our approaching the finite planetary limits of: fossil fuels and strategic minerals; natural fresh water; food-productive, arable land; habitable surface area; waste-absorptive capacity of the natural environment; and resilience of the planet's life-support ecosystems.

Examples of issues of national priority which address these "new scarcity" areas are:

- energy resource delivery and use
- energy conserving resource utilization
- optimal use of finite land resources
- energy-intensive urban growth and the quality of life

A MAJOR CONCERN OF ENVIRONMENTAL EDUCATION IS TO DEVELOP IN LEARNERS AN UNDERSTANDING OF ISSUES OF NATIONAL PRIORITY AS THEY OCCUR IN A VARIETY OF SETTINGS.

b. A setting of environmental interest provides a milieu or frame of reference for focusing on and setting boundaries for the study of an environmental or energy issue of national priority. This setting can be specified in a variety of ways according to:

(1) Natural systems boundaries

- Aquasphere (oceans, lakes, rivers, streams, marshes, aquifers, etc.)
- Lithosphere (mountains, plains, forests, woodlands, deserts, etc.)
- Atmosphere (rainfall, winds, temperatures, sunlight, etc.)

(2) Human systems boundaries[1]

- Shelters (housing, community facilities, city centers)
- Networks (public utility systems, transportation systems, communication systems)
- Individual (physiological needs, safety and security, affection, belonging, esteem, self-actualization, knowledge, aesthetics)
- Society (government systems, legal systems, economic systems, political systems, cultural patterns, population trends, health and welfare systems)

(3) Geographical-political boundaries

- Local, county level of focus
- Multi-county, state level of focus

[1]Adapted from Ekistics, Vol. 41, No. 246, May, 1976, pp. 257-262.

- Multi-state, regional level of focus
- National level of focus
- International, global level of focus

An example of an issue of national priority specified in terms of a setting of environmental interest is: the impact of a proposed rapid transit system for the city and county of Metropolis (geographical-political setting).

c. Topic and process areas provide important focus points for selecting and organizing learning resources to study environmental and energy issues of national priority within specific settings.

> A CENTRAL CONCERN OF ENVIRONMENTAL EDUCATION IS TO DEVELOP IN LEARNERS AN UNDERSTANDING OF THE IMPACTS AND INTERRELATIONSHIPS OF VARIOUS TOPIC AREAS AS THEY ADDRESS ISSUES OF NATIONAL PRIORITY OCCURING IN SPECIFIC SETTINGS.

(1) Key topics provide the learner with a variety of convenient areas[1] for studying an environmental/energy issue of national priority. These areas are so interrelated with respect to environmental issues in general that an entry investigation of one area leads, in most cases, to an investigation of the others as well.

The key topic areas include:

TOPIC ORIENTED

- Population dynamics
- Pollution
- Resource allocation and depletion
- Conservation
- Transportation
- Technology
- Urban and rural planning
- Environmental quality
- Ecological balance
- Natural resource related careers and vocations
- Economic and technological development
- Environmental ethics

[1] All but the last three of these have been designated by the Environmental Education Act, Public Law 91-516 (as amended by P. L. 93-278) as areas of major importance in environmental education. The last three have been added by the developers of this module.

A MAJOR CONCERN OF ENVIRONMENTAL EDUCATION IS TO DEVELOP IN LEARNERS AN UNDERSTANDING OF AND FACILITY IN APPLYING PROCESSES IN STUDYING ISSUES OF NATIONAL PRIORITY WITHIN SPECIFIED SETTINGS.

(2) Key processes provide the learner with useful conceptual and analytic entry points for studying any issue of national priority in any setting. These processes do not conflict with, but instead complement, the topic oriented entry points specified previously.

The key processes include:

PROCESS ORIENTED

- Analytical or conceptual tools for understanding energy and environmental systems
- Problem-solving and decision-making strategies
- Holistic lifestyle assessment
- Fundamental concepts and principles of energy (energetics)
- Energy delivery systems and processes
- Forecasting, planning, and policy formation
- Futures thinking

Examples of topic and process oriented content which might be studied in the example situation of investigating the impact of the rapid transit system on Metropolis are:

TOPIC ORIENTED CONTENT

Projected increases in transportation needs and the impact on environmental quality

Population dynamics and urban sprawl

PROCESS ORIENTED CONTENT

Quality of life assessment as a basis for decision-making (problem-solving and decision-making strategies)

Net energy costs and benefits involved in rapid transit operations (energy delivery systems and processes).

YOU SHOULD NOW BE FAMILIAR WITH THE BASIC CHARACTERISTICS OF AN ENVIRONMENTAL, ENERGY-FOCUSED PROBLEM CONTEXT--SPECIFICALLY ADDRESSING:

- AN ISSUE OF NATIONAL PRIORITY
- IN A SETTING OF ENVIRONMENTAL INTEREST
- WITH TOPIC/PROCESS ORIENTED CONTENT

In the section which follows, the problem context becomes the basis for your planning an environmental energy-focused instructional unit(s) or lesson(s) for your students.

d. The Contextual Map

In order to identify the key topics, concepts and principles which constitute the "territory" of urban growth, problems and issues, we have developed--as a design tool--the notion of a contextual map. This map shows not only the relevant topic areas, but also demonstrates the relationships of the content. It ensures that the problem area is presented in terms of both natural and human systems considerations as well as the interactions between the systems. This contextual map is useful as an organizational tool and a point of reference for teachers.

The contextual map organizes the module content into:

- content dealing primarily with NATURAL SYSTEMS:
- content dealing primarily with HUMAN SYSTEMS; and,
- content dealing with the INTERACTIONS between these two systems.

These major sectors are drawn as follows:

NATURAL SYSTEMS	INTERACTIONS	HUMAN SYSTEMS

The map further organizes the module content into:

- content dealing primarily with OPERATIONAL aspects (processes, functions, and applications of concepts); and
- content dealing primarily with CONCEPTUAL aspects (emphasizing ideas, theories, principles and laws)

OPERATIONAL	NATURAL SYSTEMS	INTERACTIONS	HUMAN SYSTEMS	OPERATIONAL
CONCEPTUAL				CONCEPTUAL

The sectors of this map are drawn as though they are all the same size. However, it is apparent that all are not equally represented by content material. This is intentional. The URBAN GROWTH contextual map is heavily weighted in the HUMAN SYSTEMS and INTERACTIONS sectors, due to the nature of the content--urbanization is a distinctly human endeavor.

The map (which follows) has a brief description of each sector, indicating important concepts and principles which make up the content of this module, and also where each of these is located.

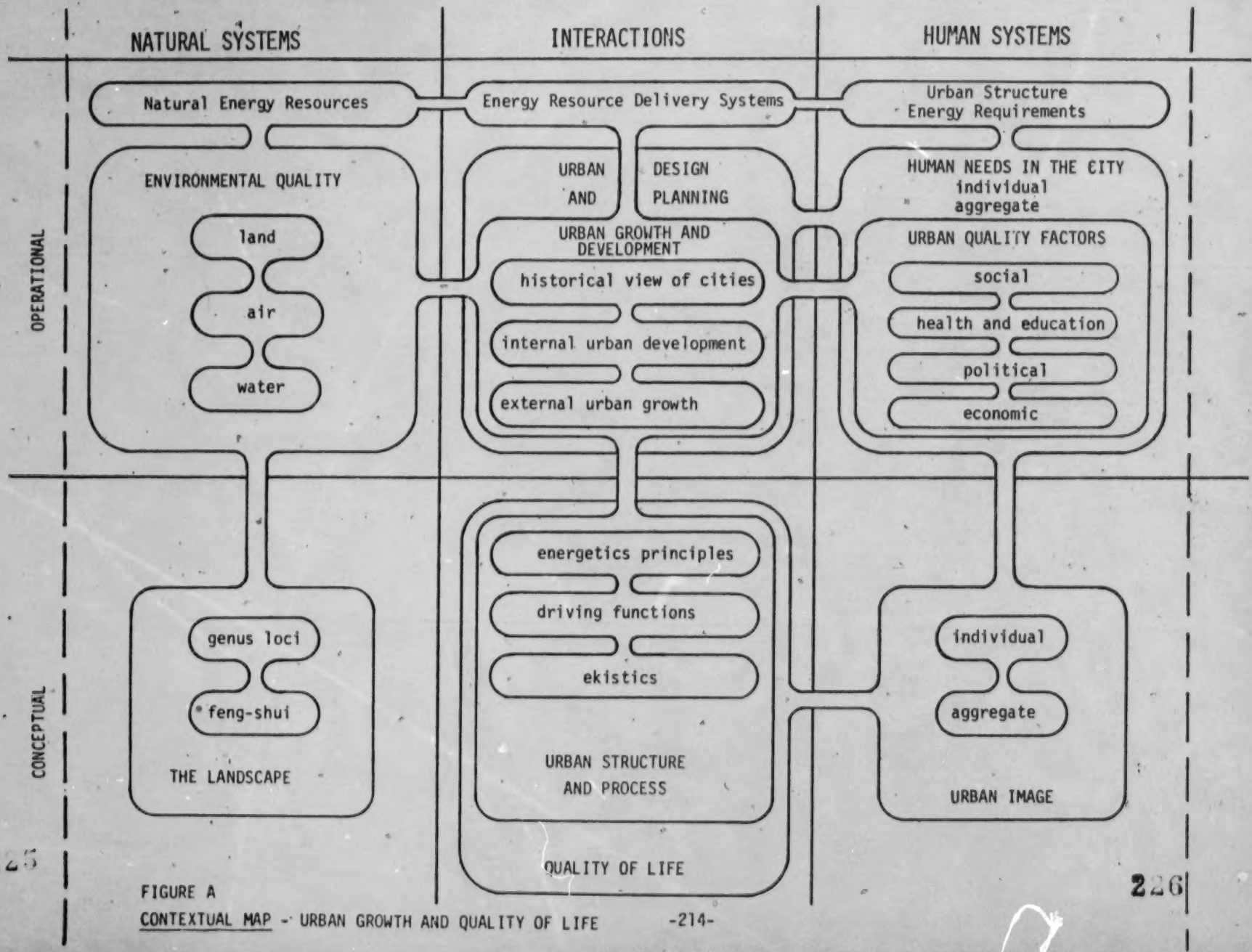

FIGURE A

CONTEXTUAL MAP - URBAN GROWTH AND QUALITY OF LIFE

CONTEXTUAL MAP: ENERGY INTENSIVE URBAN GROWTH AND THE QUALITY OF LIFE

The satisfaction of human needs through the utilization of natural resources is an interactive process. This Contextual Map indicates these connections between natural and human systems in the city.

NATURAL SYSTEMS CONCEPTUAL: Any place in which humans settle exhibits certain distinctive characteristics. These can be inherent natural characteristics or can evolve as human impact (on the land) creates new viewpoints or alters the ecosystems of the area. This concept of inherent site characteristics is called the landscape. "Genus loci" and feng-shui" are two ways to interpret this concept.

NATURAL SYSTEMS OPERATIONAL: Any urban place will originate in surroundings which have a particular environmental quality. The natural ecosystems both inside and outside the urban environment will adapt to a certain degree to human impact on the land, air, and water. When they cannot adapt further, they become altered or are destroyed. Part of this impact is felt outside the urban system, where the city places demands on natural energy resources to satisfy the various energy requirements of the city, including transportation, building, and maintenance.

HUMAN SYSTEMS CONCEPTUAL: People that live in towns and cities carry an evolving perception of the urban place. This urban image is both individual and collective. The former involves an individual's feelings and thoughts about their city and relationships with other people. The latter involves the way large groups of people make their way through the city--their collective patterns of movement and their social structures. This urban image is central to studies in environmental psychology.

HUMAN SYSTEMS OPERATIONAL: Urban energy requirements arise out of the ways we satisfy human needs in the city. These needs are both individual, (needs for survival and basic health), and aggregate, (such socially-derived needs as police and fire protection, economic structures, and the theatre). The manner in which these needs are satisfied gives us a view of certain aspects of urban quality. This, in turn, contributes to the urban image.

INTERACTIONS CONCEPTUAL: There are many avenues for examining city functions. To explore these urban structure and processes, three concepts we can utilize are: the principles of energetics; the concept of driving functions, which supply energy for urban growth; and the framework of ekistics, which provides a holistic outline for the study of human settlements. All of the natural and human system processes contribute to the quality of life in the city. This concept is important to the way we interpret the urban image, and the way we attend to urban design and planning.

INTERACTIONS OPERATIONAL: In order to satisfy urban energy requirements, energy resources are extracted, transported, converted, and distributed for use. These energy resource delivery systems provide the energy forms utilized for urban growth and development. A historical view of urban development helps us understand the two basic urban growth patterns--internal urban development and external urban growth. With an understanding of these growth patterns and the aspects of urban and environmental quality, we can undertake an urban design and planning process. A comprehensive planning process will be anticipatory in nature, and address the alternatives for optimal urban quality of life.

OBJECTIVE: (n)	To list the major topics, concepts, principles and processes associated with an environmental energy problem and display them in a contextual map.

TO DO:

1. Examine the contextual map (Figure A, p.214). Note that the map displays the major topics, concepts, principles, and processes associated with the environmental issue of Energy Intensive Urban Growth and the Quality of Life.

2. Using the general environmental issue of urban growth, select a specific urban growth problem you could present to your students. Think about this problem in terms of:

   (a) aspects involving natural systems, human systems, and the interactions between the two systems;

   (b) major topics, concepts, principles, and processes associated with these aspects.

3. List at least 20 major topics, concepts, principles, and processes associated with your urban growth problem. Clarify and display these topics, etc. using the contextual map format below:

NATURAL SYSTEMS	INTERACTIONS	HUMAN SYSTEMS

SECTION 2

CHECKLIST FOR PLANNING ENVIRONMENTAL/ ENERGY-FOCUSED INSTRUCTIONAL UNITS OR LESSONS

After completing this section you should:

(11) Be able to plan instructional activities for your students by applying a set of guideline criteria.

This section presents guideline questions for planning and developing environmental/problem-focused instructional materials and activities.

CHECKLIST FOR PLANNING ENVIRONMENTAL/ENERGY-FOCUSED INSTRUCTIONAL UNITS OR LESSONS

Having completed the preceding design activity, you are now ready to develop a tentative plan for an "urban growth focused" unit or lesson which is compatible with, but not necessarily limited to your subject area, e.g., Social Sciences, Natural Sciences, Humanities, etc. You can develop this plan by using the checklist which follows.

This checklist consists of a series of questions you should address when planning environmental/ energy-focused instructional activities for your students. Successful completion of these questions will help to ensure your developing an effective and instructionally sound unit or lesson plan.

Since the checklist questions are intended only as a guide for your planning task, you are free to address them in any of the following ways:

- you can plan a problem-focused instructional unit or lesson according to your own interests and planning style, and then refer back to the checklist to ensure that your plan is comprehensive.
- you can plan an instructional unit or lesson by answering the checklist questions directly as listed or in any order you choose.
- You can plan an instructional unit or lesson by utilizing both of these approaches, i.e., alternating between the two as your plan develops.

Whichever of these approaches you intend to use, it is strongly recommended that you begin your planning by considering the problem context of the unit or lesson (addressed in checklist question #1) which will be the basis for your entire plan.[1]

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[1]Prior to making your plan you may also want to read Appendix A, Planning Instructional Unit or Lessons, for a review of some characteristics of classroom instructional materials, and Appendix B, Developing an Instructional Unit or Lesson Following the Module Format.

CHECK COMPLETED PLANNING AREAS HERE

a. Have you selected an environmental/energy problem context appropriate for your students?

(1) Have you selected a problem area or issue of national priority or significance? ☐

What is your problem area or issue?

(2) Have you determined the level at which your problem has significance? ☐

- local, county _____
- multi-county, state _____
- multi-state, regional _____
- national _____
- international, global _____

Keep in mind that the most important environmental/energy problems have implications or counterparts at all or many of these levels.

(3) Have you characterized the major focus or emphasis of your unit or lesson? (You may prefer to answer Questions d. and e. before completing your answer here). ☐

- Natural systems functions, processes _____
- Human systems functions, processes _____
- Interactions between natural and human systems _____

Keep in mind that a HOLISTIC and INTEGRATED approach to studying the problem area would involve an examination or exploration of the complex interrelationships between natural and human systems rather than focusing exclusively on either.

(4) Have you characterized the various aspects of the problem area which your students are to investigate? (You may prefer to answer Questions d. and e. before completing your answer here). ☐

- physical _____
- social (includes economic, political, legal, etc.) _____
- aesthetic _____
- ethical _____

Keep in mind that a TRANSDISCIPLINARY approach to studying the problem area would involve an examination and synthesis of information from a variety of aspects, disciplines, or points of view.

b. Have you considered how you will introduce the problem issue to your students; how you will interest and motivate them? ☐

Pep talk ____ Movie ____ Guest Speaker ____

Field trip or site visit ____

Student self-directed activity ____

Other _____

c. Have you determined what broad or general questions regarding the problem area you want your students to answer or address? ☐

What are these general questions?

d. Have you identified key topics or sub-topics related to the problem area which your students will cover? ☐

What are these key topics or sub-topics?

e. Have you identified key concepts, principles, and terminology which will be covered? ☐

What are these key concepts, principles, ideas, and terminology?

f. Have you determined whether or not there are special knowledge or skill prerequisites that your students should have in order to study the problem area? ☐

What are these prerequisites?

g. Have you decided what learning activities you are planning to use to convey the relevant topics, concepts, principles, etc. to your students? (Example activities might include: tours, field trips, written assignments, lectures, interviews, experiments, special projects, simulations, discussions, etc.). ☐

What are these activities? (Be as specific as possible.)

(You may prefer to answer Question #1 below before completing your answer here.)

(1) Do any of the activities engage your students in PROBLEM-SOLVING or DECISION-MAKING processes with respect to the problem area? _____

(2) Are the activities ones that your students can:

- relate to in terms of their experiences? _____
- complete in the amount of time available? _____

h. Have you identified available resources which your students will need in studying the problem or issue? (Resources might include: readings, films, interviews, reports, etc.) ☐

What are these resources? (Be as specific as possible.)

i. Have you specified student learning objectives for the unit or lesson? ☐

What are these student learning objectives?

j. Have you determined how you will evaluate whether or not your students have achieved these learning objectives? (Evaluative measures might include: discussion questions, written or oral reports, special task or project assignments, test questions, etc.) ☐

What are these evaluative measures? (Be as specific as possible.)

k. Have you determined an instructional sequence and schedule for your unit or lesson? ☐

Describe the sequence of activities in as much detail as possible, i.e., describe your lesson plan.

EXAMPLE FORMAT:

Day/ week	Topics/sub-topics to be covered	Key concepts, principles, ideas to be covered	Activities to be used to convey the topics & key concepts

OBJECTIVE: (o)	To complete a checklist for planning environmental instructional units or lessons

TO DO: 1. Now that you are familiar with the characteristics of a problem context and have read over the guidelines for developing an instructional unit or lesson, you can begin the process of planning your own instructional unit, lesson, or program. Remember that your ultimate planning goals are:

- To engage students in learning activities (readings, discussions, exercises, etc.) which address environmental issues or problems, e.g., ENERGY INTENSIVE URBAN GROWTH AND THE QUALITY OF LIFE.
- To raise students' level of awareness and understanding of the issues or problems to a level as near as possible to your own.

2. Start by filling out each of the CHECKLIST items (pp. 221) as best you can. Keep in mind that these items are intended to aid you in being as detailed and specific as possible in planning your classroom environmental unit(s) or lesson(s).

3. Feel free to utilize the CHECKLIST in any way you deem helpful. For example, you may decide to: (1) develop an instructional unit or lesson plan on your own, then use the CHECKLIST items to assess the scope and adequacy of your plan; or (2) complete the CHECKLIST first, then reorganize and sequence the information into an instructional plan.

Once you have completed the APPLICATION, you should:

- BE FAMILIAR WITH THE BASIC CHARACTERISTICS OF AN ENVIRONMENTAL/ENERGY PROBLEM OR ISSUE CONTEXT.
- HAVE DEVELOPED A PRELIMINARY PLAN FOR AN ISSUE OR PROBLEM-FOCUSED ENVIRONMENTAL UNIT(S) or LESSON(S) (e.g., ENERGY-INTENSIVE URBAN GROWTH AND THE QUALITY OF LIFE) which can be implemented in your classroom.

APPENDICES

APPENDIX A:	PLANNING INSTRUCTIONAL UNITS OR LESSONS
APPENDIX B:	DEVELOPING AN INSTRUCTIONAL UNIT OR LESSON FOLLOWING THE MODULE FORMAT
APPENDIX C:	INQUIRY ACTIVITY ANSWERS

PLANNING INSTRUCTIONAL UNITS OR LESSONS

A. DISTINCTION BETWEEN A SINGLE CONCEPT AND A MULTIPLE CONCEPT APPROACH

> Question--How does a single concept approach to environmental education differ from a multiple concept approach?

A single concept approach has these characteristics:

- a single concept or skill is treated;
- instructional content is brief, requiring only a few days to complete;
- only a few, highly specific resources are used.

A multiple concept approach has these characteristics:

- several concepts or skills are treated;
- instructional content is longer, containing several concepts, and may take several weeks to complete;
- many resources, both general and specific, are used.

> Question--When should you emphasize a single or multiple concept approach?

The single concept approach should be emphasized:

- when you are dealing with a single, discrete idea or topic area--not a cluster of ideas or skills, or a problem area or theme;
- when your intent is to introduce the learner to a set or series of single concepts, ideas, or skills as preparation for presenting a more complex problem context;
- when an understanding of the overall problem area or context is not, for the moment, of primary importance.

The multiple concept approach should be emphasized:

- when you are dealing with a set of environmental concepts, ideas, or skills which are complex;
- when your intent is to involve students in planning or decision-making on a group or team basis;
- when it is important to present an entire problem context, e.g., the natural, social (including political, economic, legal), aesthetic, and ethical aspects of the selected issue as a necessary background to planning and decision-making;
- when in-depth inquiry and value-development are part of the planning and decision-making application.

These criteria are not hard and fast, but they suggest two instructional possibilities: (a) younger students might benefit more from a single concept approach in order to prepare or ready them for involvement in more complex activities; and (b) a multiple concept approach might better serve secondary school students (grades 10-12) and adults. Intermediate level students, grades 7-9, may benefit from a combination of both approaches.

In the APPLICATION, we emphasize the design of instructional units or lessons which utilize a multiple concept approach in addressing environmental issues of national importance.

B. CHARACTERISTICS OF INSTRUCTIONAL UNITS OR LESSONS

In planning environmental education instructional units or lessons, consider the following self-directing questions. As you address these questions in your initial planning, you should begin to form a general picture of the features or characteristics of your instructional units or lessons.

1. Student factors

- What is your understanding of your students' degree of preparation or readiness for problem-focused, decision-making oriented learning materials and experiences?

THINGS YOU NEED TO KNOW AHEAD OF TIME

- Is the problem area too sophisticated or complex?
- Are the reading resources (such as those presented in the bibliography of this module) too difficult, too sophisticated?
- Would learning exercises or simulation activities (such as those presented in the Inquiry section) be too difficult, too demanding?
- Would your students be able to work effectively within a group or team learning mode? Will it be necessary to utilize a more individualized learning approach? Some combination of group and individualized learning?

If you are uncertain as to your students' readiness or motivation for these activities, you may wish to assess their preparation with some preliminary learning activities involving:

WAYS YOU CAN FIND OUT

- sample readings addressing the problem context with follow-up class discussions (these may focus on single concepts or single subtopics as expedient);
- small group assignments to explore some specific community resources related to the problem context (e.g., tours, site visits, talks with knowledgeable persons, etc.);
- simplified problem-solving, decision-making, or values clarification exercises focusing on some sub-aspect of the problem issue.

Remember that in assessing your students' readiness, it is not so important to determine how much they know about the problem issue as it is to determine if they will be able to: (a) complete reading and resource exploration assignments, (b) interact and exchange ideas effectively in large or small groups, and (c) utilize problem-solving and decision-making processes required in the learning activities (exercises, simulations, etc.).

2. Teacher factors

- Do you see yourself only, you and another teacher, another teacher only, or a larger teacher team using the instructional materials?
- How much direction, guidelines, or preparatory training will this person or persons require?

WHO WILL USE THE MATERIALS

If you see yourself as the prime or sole user of the instructional materials, you will still need to specify the details of an instructional plan. The specific learning activities and the schedule of events should be specified.

If you are devising the instructional materials for other persons, then very detailed usage steps, timetables, and resource materials will need to be provided in addition to the above.

And with team-devised/team-taught materials, it is suggested that a set of directions be provided so that one person can serve as a team monitor to keep track of instructional variations, new ideas, and changes in procedures, and to monitor and record the entire set of activities.

3. Instructional factors

- What should go into the instructional plans for developing the environmental education units or lessons?

Here are a minimum number of things to consider:

a. Instructional aims--the overall educational reasons or benefits for using the materials.

b. Learning objectives--the general and specific knowledge and skill development objectives, stated in behavioral terms, that is, in terms which are measurable and observable and which specify criteria against which successful performance can be assessed. With student-training materials, the learning objectives should be keyed directly to the steps of the instructional sequence.

c. Resource requirements--the required and optional learning resources for developing students' knowledge and skills. The resources might include films, slides, and other A-V materials, maps, charts, case studies, bibliographies, monographs, periodicals, newspapers, magazine articles, textbooks, paperbacks, tours, lectures, T.V. and radio programs, site visits, agency/organization publications, interviews, field studies, learning games, simulations. These resources can be teacher-prepared, student-devised, or commercially perpared.

d. Learning arrangements--as a rule, student learning arrangements should vary or change during the instructional sequence of units or lessons. Thus, students move through a series of large group, small group, and individual study/discussion/application tasks as required by the instructional sequence. This practice offers the student not merely a "change of pace," but opportunities for escaping either psychologically or physically from the confines of standard classroom pedagogy.

e. Timetables, schedules--multiple-concept, problem-focused instructional units, especially when preceded by shorter, single-concept preparation units, may take several weeks to complete. It is important that time allocations, sequences, and schedules for instructional/learning activities be specified.

f. Information handling and evaluation--within a given unit or lesson, there are a number of useful student evaluation checks which can be built into each step of the instructional sequence, e.g., student reports, discussion worksheets, inquiry and application task checklists, and other evaluative materials. It is necessary, therefore, to indicate the procedures to be used and the forms to be collected at the end of each step. It is also necessary to key the evaluation to the student learning objectives.

g. Options and special activities--there can be many resources and activity options at each step of an instructional sequence. This flexibility should be utilized by teachers to ensure that the learning activities are compatible with the needs, interests, and abilities of students. Therefore, if desired, optional or special learning resources (and activities) can be used.

4. Instructional sequence

- What general steps or tasks need to be specified for an instructional unit or lesson which develops students' knowledge and skills in a selected environmental problem issue?

The instructional sequence or steps can follow any one of a number of formats depending on the intended users. The general format utilized in the present instructional module and a student-oriented variation of it are presented in Table One only as examples:

TABLE ONE

The teacher training module instructional sequence	A possible student lesson instructional sequence
• INQUIRY Knowledge development (utilize problem-relevant resource materials) • INTEGRATION Skill development (utilize problem-focused exercises, simulations) • APPLICATION Student learning unit/ lesson design and development	• INQUIRY Knowledge development (utilize problem-relevant resource materials • INTEGRATION Skill development (utilize problem context-focused exercises, simulations) • APPLICATION?

5. Problem context

- What tasks are necessary to develop the environmental problem context described in Section 1 of the APPLICATION?

In order to develop this problem context to a level which is presentable to students, you will need to do the following:

a. Identify a problem issue which has both national significance and significance at regional, state, or local levels.

b. Select (or develop if necessary) a regional, state, or local level scenario as a frame of reference for studying the problem issue--whichever level is of greater interest or significance to learners.

c. Identify available resources (readings, tours, lectures, films, interviews, etc.) for studying the problem issue at the level (or levels) selected.

When properly developed, the problem context will constitute an effective and comprehensive basis for exploring the environmental problem issue through case studies, simulations, and other learning activities.

DEVELOPING AN INSTRUCTIONAL UNIT OR LESSON FOLLOWING THE MODULE FORMAT

The student instructional sequence presented in Appendix A, Table One will now be utilized to present some basic tasks necessary for developing an environmental/energy-focused instructional unit or lesson similar in format to the one utilized in this teacher-training module. These tasks, when fully elaborated and geared to the students' level of sophistication, can take the form of a user-ready set of student learning materials or a set of instructional guidelines for making topic presentations, problem-focused classroom discussions, student work assignments and skill development exercises, and evaluating students' performance and progress.

Keep in mind that this is an example of only one possible instructional unit or lesson format for your students. If you wish to utilize another format, proceed according to the guideline questions of Section 2 of the APPLICATION.

STEP ONE: INQUIRY--Develops students' knowledge base regarding the selected environmental problem issue by involving them in an in-depth exploration of the problem using relevant learning resources.

1. Describe the environmental problem or issue for the unit or lesson. Tell students why this problem is significant both nationally, locally, regionally, or globally as the case may be. Tell them why you have selected this problem area from other possible ones.

2. Describe the instructional sequence for the unit or lesson, the instructional strategies you will use, and the learning arrangements they will use. Explain the general learning (knowledge and skill) objectives, the general time-line or schedule of events, the resource requirements, and the criteria and methods by which they will be evaluated (or will evaluate themselves).

3. Define all terms which students don't understand.

4. Define or describe the essential questions which must be answered regarding the problem (or have the students do this if they select the problem area). Make certain the problem issue has been adequately specified by defining or describing relevant data resources, concepts, principles, and activities related to the problem area.

5. Organize the resources in several ways to diversify students' possible entries into the knowledge base: (a) organize them according to natural systems, human systems, or the interactions between the two; (b) organize them according to topics (key environmental entities) or process (content/processes) you wish to emphasize; (c) organize them according to the various physical, social (including economic, political, legal), aesthetic, and ethical aspects of the environmental/energy problem issue.

   Teachers can begin the process of selecting and organizing student learning resources by asking themselves (a) which of the topics, sub-topics associated with the subject area, and (b) which learning resources are relevant to both the problem area and to my own subject area.

6. Develop a list of study/discussion questions to guide students in their exploration of the learning resources. Key these questions to the major features or critical points of the environmental/energy problem issue covered by the resources. Use these questions in written assignments or follow-up discussions to assess students' depth of understanding.

STEP TWO: INTEGRATION-- Develops students' skills in applying their knowledge of the environmental problem issue by involving them in policy planning and decision-making activities.

For example, a simulation activity would require you to:

1. Select or prepare a general scenario which describes the environmental problem in a specific setting (local, regional, national, global).

2. Prepare a set of descriptions or guidelines for the students to act as planners, policy-makers, and decision-makers in addressing the problem issue presented in the scenario. Organize students into groups or subcommittees and assign each to explore a different major aspect of the problem in more depth.

3. In order to heighten students' interest in the activity, you may wish to enhance the problem scenario by preparing a set of descriptions or representative articles or documents (e.g., letters of concern) which present the viewpoints and concerns of individuals and groups who might reasonably be affected by or interested in the problem issue. It may be useful to key these concerns to the major physical, social, aesthetic, and ethical aspects of the problem context.

4. Select or prepare a set of data or facts which cover the energy aspects of the problem scenario and which the students can use in their planning, problem-solving, or decision-making task. Prepare any additional information, maps, charts, illustration, etc., which the students may need.

5. Develop a general time-table or schedule for how long each task of the simulation is to last and the order in which tasks are to be carried out.

6. Define all terms and concepts which students don't understand. Clarify any misunderstanding regarding the major aspects of the problem issue, use of resources, or simulation procedures. Hold a post-simulation debriefing with students to summarize their findings, conclusions, and recommendations.

STEP THREE: EVALUATION--Evaluation items may be developed for each step or for the entire unit or lesson.

- INQUIRY evaluation should assess students' overall understanding of the key dimensions or critical aspects of the environmental problem context.

> Key question--Have students acquired the requisite knowledge and level of understanding of the environmental problem?

- INTEGRATION evaluation should assess students' general performance in developing coherent positions or in formulating justifiable policy statements regarding the problem issue.

> Key question--Are students able to utilize their knowledge and understanding in a problem-solving or decision-making task?

Keep in mind that evaluation measures may take one or several of the following forms:

Think/discussion questions

Written and oral reports

Performance assessment of activities, tasks, or special project assignments

Test questions

Appendix C provides example answers to each of the Activities in the INQUIRY. Many of these answers have been devised by teachers and are offered as a basis for comparison only.

INQUIRY ACTIVITY ANSWERS

SECTION 1

1. self-sustaining
   living and nonliving resources
   cyclical flows of energy
   cyclical movement of materials and information

2. humans modify the environment
   natural surroundings influence form, functions, and growth of the city
   continuous feedback and cyclical flow of energy and materials between individuals, society, and the physical environment

3. The amount of diversity, in addition to flexibility and complexity, in a city is an indicator of its resilience and adaptability to change.

4. geographical location
   climate
   natural resources
   agricultural capabilities
   type and location of roads

5. the capability of a system to adapt to or accommodate change without degradation
   necessary to understand carrying capacity of an urban system to be able to deal with resource use and conservation of water, food, materials, and energy

6. The ecosystem approach ensures that the interactions of a variety of complex factors, both living and non-living, affecting the urban setting, will be addressed in planning and decision-making for urban resource management.

   Relationships between flows of energy and materials into and out of cities, and the quality of life are not just economic, but are directly connected to political, social, and environmental conditions.

7. geomorphic--modern neighborhoods, small community centers
   concentric--old churches on prominent hills, central city government buildings

   orthogonal--garment districts, financial districts, industrial sections
   clusters--"bedroom communities," low income housing projects "outside of town"

SECTION 2

A sample chart:

Individual Needs	
• air (who satisfies the need for unpolluted air?)	Air Quality Board
• water	Municipal Water District
• space	
• energy (food and heat)	Local natural gas utility
• shelter	A building contractor
• waste disposal	Local garbage service
• safety	Police and fire services
Societal Needs	
• political organization	Government organizations
• economic system (labor, capital, materials, power)	Local tax assessor, labor unions
• technology	A computer company
• transportation and communication	Buslines, telephone company
• education and information	School system
• social, intellectual, spiritual	Discos, churches
• activities (recreation, "cultural" facilities, sense of community).	Parks and recreation department, theaters

SECTION 2 (cont'd)

A sample questionnaire:

1. Think of the large hill behind my town. It has rolling hills, many oak trees, lots of open space.

2. Going from home to town:

   Go down the hill and turn right at the corner. There are often lots of children at this corner waiting for the bus.

   Go left at the first stoplight--on that corner is a restaurant which always smells like steak and lobster are cooking. You can hear the freeway from here.

   Follow the main street past the "strip" of fast food places (which smell like grease), automobile sales places, rock and brick sales places, and gasoline stations.

   Slow down by the market and get in the left hand lane. Get ready to do a quick right by the beige bank building.

   Go into the parking lot in back of the store, under the willow tree. Lots of nut trees around this lot.

3. I don't like the smells of the fast-food places--the heavy grease smell seems to stay in my nose a long time.

   The parts of the town along the "strip" area, and those roads leading off here are unfamiliar--I haven't ever explored them.

   This trip takes about ten minutes.

4. The easiest parts of the trip to remember are the restaurant on the corner (which smells good), the greenery around my home and on the way. Also, the gas station at which I do business.

5. On my map, I forgot to indicate the "strip" businesses.

6. I feel familiar with another small town in the southern part of the state. It also is laid out linearly, and has many small shops, no large downtown, and a similar geographic setting.

SECTION 3

ACTIVITY I:: Sample chart provided in exercise.

ACTIVITY II: Sample chart provided in exercise.

ACTIVITY III: Answers to questions:

1. Networks: physical, economic, population movement, technological, social, service delivery, political, administrative, organizational, energy.

   Urban networks can become barriers to resolving urban problems through public participation because of overlapping jurisdictional boundaries; for example, public participation is often hampered by having to deal with multiple agencies over one issue.

2. • trade, production, and transportation systems

   • social and economic opportunities

3. Driving functions act as catalysts for change by providing energy for urban growth, such as resources, transportation, power, and communications.

4. Discussion should focus on how transportation, resource availability, energy, and communications systems helped shape the four historical patterns.

SECTION 4

ACTIVITY I:

1. Energy cost variables affect not only what the city needs to maintain itself, but also provide employment and money for economic growth. More machines, cars, high-rise buildings, and wastes accelerate growth and the use of resources through the influx, migration, and development of new businesses, increased storage facilities, higher taxes, greater reinvestment, and increased advertising.

2. Discussion should cover types of renewable and non-renewable resources, dependence on or extent of agricultural economy, types or degree of competition, type or extend of industrialized economy, transportation forms, fluctuations in business, amounts and types of consumer goods, and degree or amount of leisure time.

3. Miller's charts specify the inputs and outputs which exceed urban carrying capacity and create environmental stress.

ACTIVITY II:

1. Energy uses 1-4 can be related to at least these components in the diagram:

   (1) land in urban development
   urban structure

   (2) natural resources
   water
   people
   business money
   services

   (3) people
   energy forms
   services
   personal money

   (4) wastes and heat loss ⏚'s

SECTION 4 (cont'd)

2. Examples of the distribution of energy resources to urban use:

   (1) petroleum
   fresh water
   steam

   (2) radiant solar heat
   natural gas
   hydroelectric

   (3) petroleum

3. The only Energy Delivery Stages which were evident on the Flow Model are 7-Distribution, and 8-End Use. In most large cities, all other stages are carried out outside the urban place.

4. Example relationships:

   - Producers or extraction communities provide natural resources, agricultural goods, and often, land, in urban development.
   - First order consumers or processing and wholesaling towns provide goods, services, energy forms, and money.
   - Second order consumers or service-oriented cities provide goods and services, also materials and energy for urban structure, and large scale waste disposal.
   - Third order consumers or urban coordinators deal mainly in urban image, business money, and diverse urban activities.
   - All these provide people to the urban system.

SECTION 5

No answers: this is a personal experience assessment exercise.

SECTION 6

ACTIVITY I:

1. • Relative standards of value are qualitative. For example, the opinion of an Indian agency about logging on their reservation is relative to their culture and economy.

   • Normative standards of value are quantitative. For example, building standards form a normative standard for all like structures.

2. A designer can set up ideal images and seek to devise the ways and means to optimize urban quality. The design of a future leads to the design for a future.

3. Considerations include topographical, ecological aspects; resources; intuitive feelings about the site; folk tales or myths about the site and its people; carrying capacity of the land and water on and around the site.

4. amount of sunlight for solar heating
   wind patterns for cooling
   densification of building structures for conservation of heat
   open space and trees for cooling

5. using up available land for built structures
   declining growth
   economic stagnation
   deteriorating housing
   increased intensity of energy use for transportation, building, and maintenance

6. sweat equity programs--cooperative neighborhood ownership of structures
   new towns in town--community focus for work and residence
   new business sections--displaced residents
   densification--less need to travel, less heat loss, perhaps further deterioration outside the city

SECTION 6 (cont'd)

7. External growth occurs when cities expand boundaries and transportation arteries, resulting in the displacement of farms or undeveloped lands by suburbs and shopping centers.

8. Discussion can include quality of life considerations, residence in "natural" environment, access to city events, profitable support businesses, manufacturing and retail shipping access, separation of wealthy from poor (diseconomies), energy consumption patterns.

ACTIVITY II:

Has no answers; dependent on articles.

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